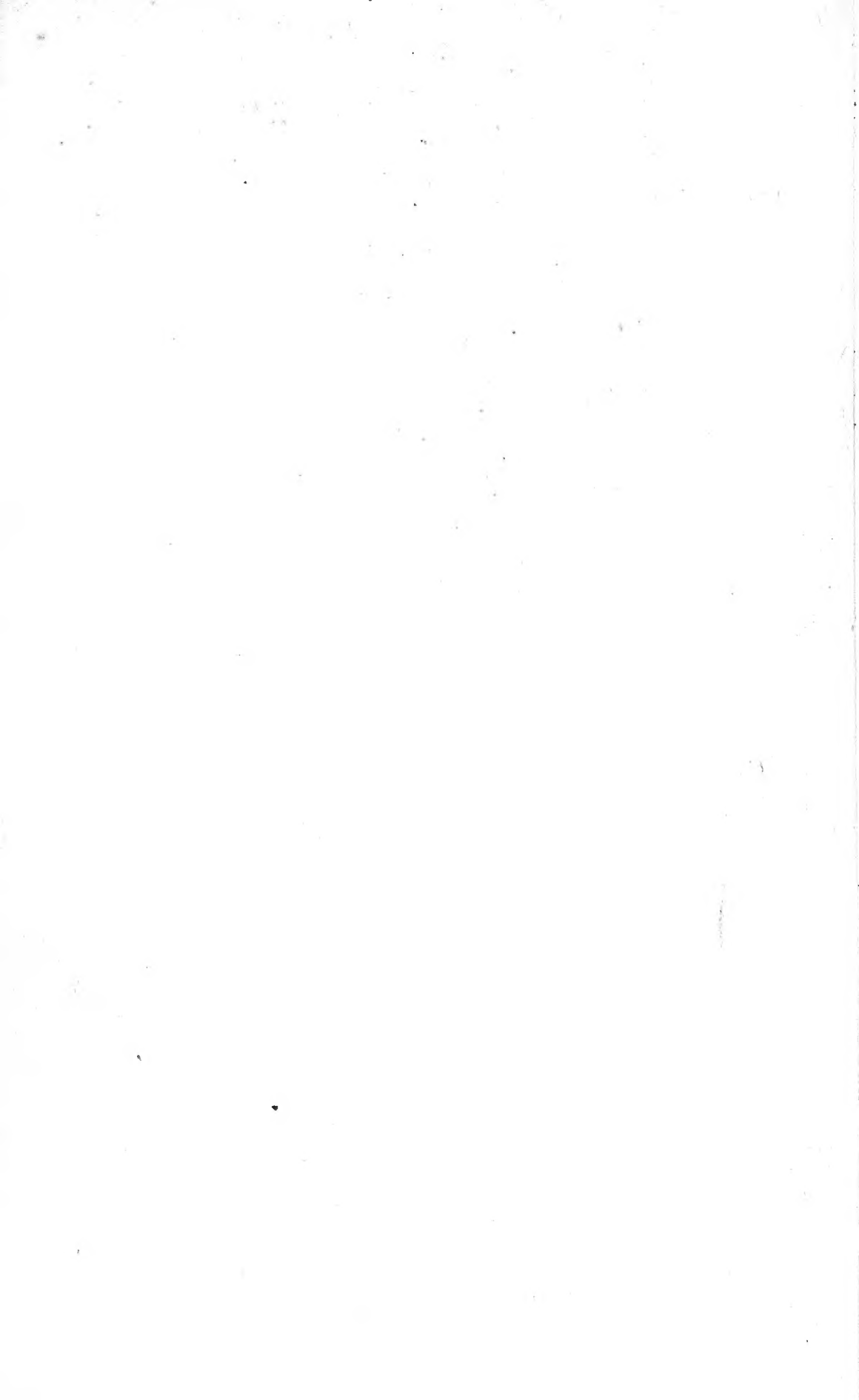


368.1-15





THE
QUEENSLAND AGRICULTURAL JOURNAL,

ISSUED BY DIRECTION OF

THE HON. THE SECRETARY FOR AGRICULTURE.

EDITED BY A. J. BOYD F.R.G.S.Q.

VOLUME XIV.

JANUARY TO JUNE, 1904.

BRISBANE:

BY AUTHORITY: GEORGE ARTHUR VAUGHAN, GOVERNMENT PRINTER, WILLIAM STREET.

1904.



	Page.
An Australian Industry—Cotton...	193
An Effective Mouse-trap ...	446
An Effective Stumping Machine ...	65
An Ideal Sugar-cane...	268
An Improved Bee Escape ...	262
An Ingenious Hand-milking Machine ...	102
An Interesting Experiment—Water Culture	174
Angora Goats...	95, 320
Animal Pathology ...	51, 293
Answer to Correspondents ...	69, 134, 219, 303, 367, 449
Ants, Exterminating ...	2
Apiculture ...	262
Arrowroot, Queensland ...	449
Arsenic, The Cost of ...	450
As Others See Us ...	150
Australia, Natal Wattle Bark for ...	264
Australia—Wheat Yield for 1903-4 ...	4
Australian and New Zealand Butter, Why has it Fallen in Price, and not Danish?	247
Australian Honey in London ...	262
Australian Wines in England ...	133
Automobile on the Farm ...	24
Average Prices for Fruit, Vegetables, Meat, &c., in the Brisbane Markets	72, 138, 221, 305, 368, 451
B.	
Bacon, To Produce, by Feeding ...	100
Banana Sugar...	66
Bananas, Mooloolah ...	256
Bananas not Maturing ...	220
Barbados Cotton in the English Market	347
Barcaldine, Cotton at ...	194
Bark, Natal Wattle, for Australia ...	132
Barley, Malting ...	13
Barren Lands, Making Fertile ...	384
Bee Escape, An Improved...	262
Beef, Rolled and Salted ...	449
Beeswax, Refining ...	449
Bauhinias, Two Showy ...	267
Binder Twine, The Scarcity of ...	95
Boll Weevil, Combating the ...	361
Boll Weevil, Cotton ...	352, 361
Bonus for Cotton ...	350
Boom in Fruit ...	111
Botany ...	18, 33, 263

	Page.		Page.
Breeding Geese for "Foie Gras" ...	108	Cotton at Barcaldine ...	194
British Markets, Prices in, of Articles		Cotton Bales, Weight of ...	412
which can be produced in Queensland...	59,	Cotton, Barbados, in the English Market	347
128, 213, 298, 363,	443	Cotton Boll Weevil ...	352
British Poultry in South Africa ...	106	Cotton, Bonus for ...	350
Brood Sows, Selection and Care of ...	98	Cotton, Caravonica, for the Soudan ...	123
Brooder, A Home-made ...	179	Cotton Conference ...	402
Brooder, How to Use a ...	331	Cotton Cultivation ...	121, 188, 269
Brookfield, Industries of ...	303	Cotton Culture, A Few Principles to be	
Broom Millet ...	229	Observed in ...	414
Bull, A Famous Hereford ...	101	Cotton, Empire-grown ...	38
Burmah, Teak Planting in ...	437	Cotton-ginning Establishments, Central	351
Bush Hay Conservation ...	292	Cotton-growing Movement ...	357
Butter, Cheese, and Milk, Yield of, per		Cotton Gins ...	71
Cow ...	70	Cotton Gins in Trinidad ...	412
Butter, Danish ...	301	Cotton-growing, A Few Principles to be	
Butter, Detection of Margarine in ...	165	Observed in ...	414
Butter, Export of ...	174	Cotton-growing in Egypt ...	277
Butter Fat, Percentage for Factory Pur-		Cotton-growing in Queensland ...	218, 400
poses ...	69	Cotton-growing Movement in Queensland	357
Butter-makers, Notes for ...	388	Cotton Imports into the United Kingdom	253
Butter, Siberian ...	133	Cotton in Cuba ...	352
Butter Trade, Export and Dairy Inspec-		Cotton in Many Lands ...	347
tion ...	327	Cotton in Porto Rico ...	43
Butter Trade, Will the War Affect it? ...	387	Cotton, Instructions for Planting	411
Butter, Why has Australian and New		Cotton in the Central Districts ...	194, 413
Zealand Butter Fallen in Price and not		Cotton-leaf Blister Mite ...	351
Danish? ...	247	Cotton Lint, How to Estimate the Weight	
Buttons from Milk ...	37	per Acre ...	411
By-products of the Grape ...	265	Cottons Loans ...	356
C.		Cotton Market—Prospects of the Queens-	
Canada, Harvesting in ...	148	land Farmer ...	276
Canvas, Water-proofing ...	219	Cotton Notes ...	279
Cape v. Turkey Mohair ...	168	Cotton-planting, Instructions for ...	411
Caravonica Cotton for the Soudan ...	123	Cotton, Sea Island, The Price of ...	413
Carbon Bi-sulphide, Its Use as an Insecti-		Cotton Seed ...	355
cide ...	211	Cotton Seed, Uses of ...	196
Cardamoms ...	124	Cotton, The Supply of ...	412
Carrots for Stock ...	136	Cotton, Threshing ...	399
Carrots, White, as a Fodder for Dairy		Cotton Bales, Weight of ...	412
Cattle ...	170	Cotton, West Indian, at Liverpool ...	43
Castor Oil Plant ...	284	Cotton, Whipping ...	303
Catechism of Cotton ...	274	Cotton Worm ...	40, 195, 361
Caterpillars on Orange-trees ...	304	Cotton Worm, Combating, by Means of	
Cauliflowers, Growing ...	76	Parasites ...	361
Cauliflowers, Planting out ...	220	Couch Grass, To get Rid of ...	303
Central Cotton-ginning Establishments...	351	Cow, How Much Food is Needed for a ...	21
Central Districts, Cotton in the ...	194, 413	Cow's Teat Closing ...	398
Ceylon, Rubber in ...	414	Cow's Teats, Warts-on ...	304
Ceylon Tropical Agriculturist Prizes	301	Cracked Crockery, To Mend ...	218
Cheap Winnowing Machine ...	135	Crossing, Dehorning by ...	96
Citrus Fruit, Sweating ...	184	Cuba, Cotton in ...	352
Clay Soils, Lucerne on ...	88	Cucumber and Tomato Plants, A Method	
Closing of a Cow's Teat ...	398	of Rendering, Immune against Fungus	
Cocoanut-tree Diseases ...	292	Parasites ...	126
Cold Storage and Fruit-growing ...	340	Cultivation of Sweet Potatoes ...	89
Combating the Boll Weevil ...	361	Cure for Dysentery ...	69
Combating the Cotton Worm by Means		Cure for Redwater, A Possible ...	173
of Parasites ...	361	Cure for Snake-bite ...	66
Combination Hoe ...	178	Cure for Stock which have eaten Poisonous	
Common Fibre Plant, Notes on a ...	200	Plants ...	50
Common Schools, Agriculture in ...	5	Cure for Swine Fever ...	100
Conservation of Bush Hay ...	292	Customs Union of South Africa, Import	
Conservation of Forests in Queensland ...	433	Duties ...	453
Contributions to the Flora of Queensland	33,	Cuttings, Growing Pear-trees from ...	304
263		Cuttings, Rosellas from ...	64
Co-operation in Italy ...	153	Cyphers Incubators ...	450
Corn-growing ...	237	D.	
Correspondents, Answers to ...	69, 134,	Daintree, A Sugar-mill for the ...	63
219, 303, 367,	449	Daintree, Notes from the ...	63
Cost of Arsenic ...	450	Dairy Cattle, White Carrots as a Fodder	
Cost of Growing Wheat in New South		for ...	170
Wales ...	301	Dairy Cow, How to Select a ...	166
Cost of Growing Wheat in South Australia	317	Dairy Farmers, Notes for ...	325
Cotton ...	402	Dairy Herd, Queensland Agricultural	
Cotton, an Australian Industry ...	193	College ...	167, 246, 329, 397

	Page.
Dairy Inspection and the Export Butter Trade	327
Dairy Produce, Flavours in	389
Dairying 20, 96, 165, 244, 320, 387	
Dairying at Dugandan	20, 102
Dairying—Forge Ahead	97
Dam, The Largest, in the World	301
Danish Butter	301
Dead Weight of Pigs	304
Dehorning by Crossing	96
Denmark's Exports of Eggs, Butter, Bacon, and Meat	24
Destroying Lantana	450
Destruction of Grasshoppers	48
Detection of Margarine in Butter	165
Device for Planting Trees	63
Dip Solution, Testing	367
"Dry" or "Wet" Milking	245
Dugandan, Dairying at	20, 102
Duties on Articles Imported into South Africa	453
Dysentery, a Cure for	69

E.

Earth or Pea Nuts	313
Education, Technical	201
Effective Mouse-traps	446
Egg-bound Hens	70
Egg-laying Competition, Queensland Agricultural College	448
Egg-laying Competition, Hawkesbury College	336
Eggs, Butter, Bacon, and Meat, Denmark's Exports of	24
Eggs by Rail	450
Eggs, Preserving	109
Egypt, Cotton-growing in	277
Empire-grown Cotton	38
England, The Potato Boom in	77
English Language, Words in the	217
Enoggera Sales 73, 138, 222, 306, 369,	452
Ensilage	6, 309
Entomology	48
Entomology, The New	186
Eucalyptus Oil	449
Experiment, An Interesting	174
Experiments in Fattening Pigs	22
Export Butter Trade and Dairy Inspection	327
Export of Butter	174
Export of Queensland Fruit	112
Exterminating Ants	2
Extermination of Prickly Pear	237
Extermination of Rabbits	110

F.

Factories, Notes for	388
Factory Purposes, Percentage of Butter Fat for	69
Factory, The Farmers' Duty to the	327
Farm and Garden Notes 75, 141, 225, 308,	371, 454
Farm Produce in the Brisbane Market, Prices of 72, 138, 221, 305, 369,	451
Farm, Sheep and Goats on the	18
Farm, The Automobile on the	24
Farm, The Firestick on the	163
Farm, The Training of Young People on the	3
Farmers and Fruit-growers, Useful Information for	255
Farmers' Duty to the Factory	327
Farms, Sewage, in India	154

Fattening Pigs, Experiments in	22
Feeding to Produce Firm Bacon	100
Fence, A Living	63
Fern, Mr., at Highfields	338
Fibre Plant, Notes on a Common	200
Firestick on the Farm	163
Firm Bacon, Feeding to Produce	100
Fixing Ammonia from Urine	448
Flat Chinas from Seed	132
Flavours in Dairy Produce	389
Flax Industry of New Zealand	242
Flora of Queensland, Contributions to the	33, 263
Flying Foxes	30
"Foie Gras," Breeding Geese for	108
Food Governs Growth	161
Forecasting the Weather, A. Simple Method of	431
Forest Chips	437
Forest Officers, The Training of	46, 68
Forest Resources of Australia Available for British Commerce	438
Forest Protection	432
Forester, A Notable	438
Forestry	44, 432
Forestry in Germany	243
Forests, Conservation of, in Queensland	433
Forge Ahead (Dairying)	97
Formalin, An Antiseptic	367
Formalin, Pickling Wheat with	384
Foster-mother, How to Make a	135
Fowls for Show, Preparing	249
Fowls, To Tell the Age of	109
Frost-Proof Potatoes	304
Fruit, Queensland-grown, The Export of	112
Fruit Fly, Poisoning the	255
Fruit, Great Boom in	111
Fruit-growing and Cold-storage	340
Fruit, Prices at Roma-street Market 72, 138,	221, 305, 368, 451
Fruit Trees, Root-pruning	117
Fruit Trees Running to Wood	135
Functions of Food and Hoven	51

G.

Garden Manures Wasted	119
Gate Hinge, A Light Home-made	183
Gate Latch, A Serviceable	47
Geese, Breeding, for "Foie Gras"	109
General Notes 62, 132, 217, 301, 366,	446
German Textile Progress	197
Germany, Forestry in	243
Ginger, Indigenous	118
Goats and Sheep on the Farm	18
Goats, Angora	95, 320
Goats, Milch	366
Good Potato Manures	148
Good Roads 84, 151, 235,	312
Grafting Persimmons	304
Grape, By-products of the	265
Grape Juice	62
Grass, Roadside	31
Grasshoppers and their Destruction	48
Grasshoppers—their Habits and Remedies	48
Grasses for Pasture on the Tropical Coast Lands	137
Great Boom in Fruit	111
<i>Grewia polygama</i> —a Cure for Dysentery	69
Growing Cauliflowers	76
Growing Flat China Peaches from Seed	132
Growing Linseed	17
Growing Pear Trees from Cuttings	304
Growth, Food Governs	161
Guinea Fowls	108

	Page.		Page.
H.		K.	
Hams or Pork, To Pickle	133	Kerosene, Medicinal Properties of ...	70
Hand-milking Machine, An Ingenious ...	102		
Hand-refrigerating Machine	219	L.	
Harvesting and Storing Mangels	87	Land Available for Immigrants	380
Harvesting in Canada	148	Lantana, Destroying	450
Harvesting, Motors for	92	Largest Dam in the World	301
Harvesting Wheat on Sundays ... 66, 149,	297	Latch, A Serviceable	47
Hawaii, Importation of Plants, Fruits,		Lecture on Poultry	248
&c., into	II.	Legal Questions	442
Hawkesbury College Egg-Laying Competi-		Leghorns, White	304
tion	336	Letter from the Daintree	63
Hemp, Manila	353	<i>Leucosmia Chermsideana</i>	264
Hemp, Sisal 219, 280,	367	Linseed-growing	17
Hemp, Sisal, at St. Helena	266	Living Fence	63
Hens and Roosters	110	Living Willow Weirs	91
Hens, Egg-bound	70	Loans, Cotton	356
Hens, Number of, per Male Bird... ..	134	London, Mangoes for	31
Hereford Bull, A Famous	101	London, Oranges for	31
Hickory King Maize	131	Lucerne on Clay Soils	88
Highfields, Mr. Fern at	338		
Hinge, A Light Home-made	183	M.	
Hints on Working an Incubator	331	Machine, A Milking	220
Hoe, A Combination	178	Machine, An Ingenious Hand-milking ...	102
Home-made Brooder	179	Machine for Extracting Plantain Fibre ...	286
Home-made Gate Hinge	183	Machinery, Wood-pulping	44
Honey, Australian, in London	262	Madras, Irrigation in	346
Honey Beer or Mead	164	Maize, Hickory King	131
Horse, How to Breed the Queensland ...	25	Maize in the Silo	69
Horse, The Topography of a	175	Making Barren Lands Fertile	385
Horse with Sore Breast	136	Malting Barley	13
Horses 25, 104,	175	Mangels, Harvesting and Storing	87
Horticulture	119	Mangels, Notes on	7
Hoven	119	Mango Trees, Working Over	28
How Much Food is Needed for a		Mangoes for London	31
Cow?... ..	21	Mangoes, Hybridising	112
How to Estimate the Weight of Cotton		Manila Hemp	353
Lint per acre	411	Manure, Natural	90
How to Make a Foster-mother	135	Manures and How to Mix Them	10
How to Mix Manures	10	Manures for Potatoes	148
How to Select a Dairy Cow	166	Manures for Tomatoes	81
How to Tan	27	Manures Wasted	119
How to Use a Brooder	331	Mapleton, Sea View Orchard	68
Hybridising the Mango	112	Margarine, Detection of, in Butter ...	165
		Market for Pineapples	117
I.		Markets 72, 138, 221, 305, 368,	451
Immigrants, Land Available for	380	Mead, or Honey Beer	164
Import Duties, South Africa	453	Medicinal Properties of Kerosene	70
Importation of Soils, Fruits, Plants, &c.,		Medium Quality Mohair	323
into Hawaii	II.	Milch Goats	366
Improved Bee Escape	262	Milk, Buttons from	37
India, Sewage Farms in	154	Milk Suppliers, Notice to	320
Incubator, Hints on Working an... ..	331	Milking Competition, Queensland Agricul-	
Incubator, The Cypher	450	tural College	172
Indigenous Ginger	118	Milking Cows	244
Industries of Brookfield	303	Milking, "Dry" or "Wet"	345
Industries, Tropical 38, 120, 188, 269, 347,	399	Milking Machine	220
Ingenious Hand-milking Machine	102	Milking Machine, An Ingenious	102
Ink Weed	303	Millet, Broom	229
Insect Powder, Persian	64	Millet Seed	134
Instructions for Planting Cotton	411	Mohair, Cape v. Turkey	168
Irrigation in Madras... ..	346	Mohair, Medium Quality	323
Italy, Co-operation in	153	Mooloolah Bananas	256
		Motor Cultivation to Make British Corn-	
J.		growing Profitable and the Harvest	
<i>Journal</i> , Non-delivery of	219	Safe in Wet Seasons	82
<i>Journal</i> , The Price of	367	Motor Binder Trials in Wigtonshire,	
Judging at Shows by Officers of the De-		England	6
partment of Agriculture	68	Motors for Harvesting	92
Juice, Grape	62	Mouse-traps, Effective	447
Jute	423	Mule-breeding	70
		Mustard Pickle	64

N.		Page.			Page.
Nail Wounds ..	...	302	Pigs, Dead Weight of ...	...	304
Natal Wattle Bark for Australia ...	...	132	Pigs, Experiments in Fattening ...	...	22
Natural Manure ...	...	90	Pigs, Nut-grass for ...	...	101
New Rules for Ploughing Matches ...	...	217	Pineapple Culture ...	...	257, 341
New South Wales, Cost of Growing	...	...	Pineapples, A Market for ...	...	117
Wheat in ...	...	301	Plantain Fibre, A Machine for Extracting	...	286
New Varieties of Potatoes... ..	147,	377	Planting-out Cauliflowers ...	...	220
New Weed Exterminator ...	...	149	Planting Trees, A Device for ...	...	63
New Year ...	...	1	Ploughing Matches, New Rules for	...	217
New Zealand, Poultry in ...	...	179	Ploughs and Ploughing ...	...	375
New Zealand, The Flax Industry of	...	242	Poison for Prickly Pear ...	...	367, 450
Non-delivery of <i>Journal</i> ...	...	219	Poisoning the Fruit Fly ...	...	255
North Queensland, Notes on Tropical	...	...	Pork or Hams, to Pickle ...	...	133
Plants Suitable for ...	...	360	Possible Cure for Redwater ...	...	173
Notes, Farm and Garden ... 75, 141, 225,	308,	...	Possibilities of Ramie ...	...	414
...	371,	454	Potash, American ...	...	137
Notes, Cotton... ..	...	279	Potato, a Valuable ...	...	147
Notes for Butter-makers ...	...	388	Potato Boom in England ...	...	77
Notes for Dairy Farmers ...	...	325	Potato Boom, Will it Last? ...	...	242
Notes from the Daintree ...	...	63	Potato Manures ...	...	148
Notes, General ... 62, 132, 217, 391, 366,	446	...	Potatoes from Cuttings ...	...	235
Notes on a Common Fibre Plant ...	...	200	Potatoes, Frost-proof ...	...	304
Notes on Mangels ...	...	7	Potatoes, Sweet, from Seed ...	...	90
Notes on Tropical Plants Suitable for	...	...	Potatoes, The New Varieties of ...	147,	377
North Queensland ...	...	358	Potatoes, Valuable, to Increase ...	...	241
Notes, Orchard ... 74, 140, 223, 307, 370,	455	...	Potatoes, When to Plant, in the Roma	...	...
Notes, Poultry ...	...	250	District ...	...	135
Notes, Tobacco ...	...	120, 199	Potatoes, £400,000 a Ton for ...	...	366
Number of Hens per Male Bird ...	...	134	Poultry ...	106, 179, 248, 331,	448
Nut-grass for Pigs ...	...	101	Poultry and Bees at the Queensland Agri-	...	...
			cultural College ...	...	179
			Poultry-breeding, Practical ...	181, 251,	338
			Poultry, British, in South Africa...	...	106
			Poultry Farming ...	...	332
			Poultry for Profit ...	...	180
			Poultry in New Zealand ...	...	179
			Poultry in the Orchard ...	...	254
			Poultry in the United States ...	...	66
			Poultry, Lecture on ...	...	248
			Poultry Made Profitable ...	...	180
			Poultry Notes... ..	250,	336
			Poultry Show, Queensland Poultry Club	...	302
			Poultry, Why Farmers Should Grow	...	...
			More ...	...	253
			Practical Poultry-breeding... ..	181, 251,	338
			Preparing Fowls for Show ...	...	249
			Preserving Eggs ...	...	109
			Preserving Olives ...	...	185
			Price of Sea Island Cotton... ..	...	413
			Prices for Farm Produce at the Bris-	...	...
			bane Markets 72, 138, 221, 305, 369,	451	...
			Prices for Fruit at Roma-street Markets	...	...
			72, 138, 221, 305, 368, 451	...	...
			Prices in British Markets of Articles	...	...
			which can be produced in Queens-	...	...
			land ... 59, 128, 213, 298, 363,	443	...
			Prickly Pear, Extermination of ...	...	237
			Prickly Pear Poison... ..	...	367, 450
			Prize Essays, <i>Tropical Agriculturist</i>	...	301
			Produce Markets 72, 138, 221, 305, 369,	451	...
			Profit, Poultry for ...	...	180
			Profitable Wheat Crop ...	...	13
			Public Announcements ...	...	v.
			Publication Received ...	...	302
			Pulping Machinery and Wood Pulp	...	44
			Pyrethrum or Persian Insect Powder	...	64
			Q.		
			Queensland Agricultural College—	...	...
			The Dairy Herd ...	167, 246, 329, 397	...
			Egg-laying Competition ...	...	448
			Milking Competition ...	...	172
			Poultry and Bees at ...	...	179
			Report on Work at ...	...	239
			<i>Queensland Agricultural Journal</i>...	...	367
			Queensland, Cotton-growing in ...	...	218, 400

N.

Page.

Page.

O.

P.

Q.

	Page.
Queensland, Conservation of Forests in	433
Queensland Flora, Contributions to the	33, 263
Queensland-grown Fruit, The Export of	112
Queensland, Land Settlement in	380
Queensland Saddle Horse and How to Breed it	25

R.

Rabbits, Extermination of	110
Rainfall in the Agricultural Districts	59,
128, 213, 298, 363,	443
Raising Strawberry Plants	187
Ramie Cultivation	352
Ramie, The Possibilities of	41
Redwater, Possible Cure for	173
Refining Beeswax	449
Refrigerating Machine, A Hand	219
Registration of Stallions	176
Remedy for Tick Fever	297
Report on Work, Queensland Agricultural College	239
Reptiles, Vision of	386
Rhodesia, <i>Agricultural Journal of</i>	302
Rice	428
Ripening Persimmons	186
Roadside Grass	31
Roads	84, 151, 235, 312
Rolled and Salted Beef	449
Roma District, When to Plant Potatoes in the	135
Root-pruning Fruit Trees	117
Rosella Cuttings	64
Roma-street Markets, Prices for Fruit at	72,
138, 221, 305, 363,	451
Roman Wine "Fakers"	366
Root Crops	227
Rubber in Ceylon	414
Rules, New, for Ploughing Matches	217
Rusty Nail Wounds	302

S.

Sales, Enoggera	73, 138, 222, 306, 369,	452
Salting Beef, To Keep	...	449
"Sapsford's Queensland Almanac and Gazetteer for 1904"	...	125
Scale Insect, Orange-tree	...	450
Scarcity of Binder Twine	...	95
Schools, Agricultural Education in	...	11
Schools, Common, Agriculture in	...	5
Science	...	201, 289
Sea Island Cotton, The Supply of	..	413
Sea Islands	...	413
Seaview Orchard, Mapleton	...	68
Seed, Sweet Potatoes from	...	90
Selection and Care of Brood Sows	...	98
Serviceable Gate Latch	...	47
Sewage Farms in India	...	154
Sheep and Goats on the Farm	...	18
Sheep v. Wild Oats	...	317
Shows, Agricultural and Horticultural	67, 133 218, 302, 367,	448
Siberian Butter	...	133
Silage v. Cured Fodder	...	165
Silo, Maize in the	...	69
Silverfish, To Banish	...	135
Simple Machine for Extracting Plaintain Fibre	...	286
Simple Method of Forecasting the Weather	...	431
Sisal Hemp	...	219, 266, 280
Sisal Hemp at St. Helena	..	266
Sisal Hemp Plants	...	219, 280, 367
Snake-bite Cure	...	66
Some Further Pieces of American Good Roads Wisdom	...	312

	Page.
Sore Breast, Horse with	136
Sore Teats	69
Soudan, Caravonica Cotton for the	123
South Africa, British Poultry in	106
South African Customs Union Tariff	453
South Australia, Cost of Growing Wheat in	317
Sparrows	118
Stallions, The Registration of	176
State Schools, Agriculture in	160
Statistics	59, 128, 213, 298, 363, 443
Stock, Carrots for	136
Stone-fruit Trees Running to Wood	135
Storing Mangels	87
Strawberry Plants, Raising	187
Stumping Machine, An Effective	65
Sugar-cane, An Ideal	268
Sugar-canes, Valuable	361, 430
Sugar from Bananas...	66
Sugar-mill for the Daintree	63
Sugar Regulations	38
Sundays, Harvesting on	66, 149, 297
Sunflower Seed	12, 135
Sunflowers	311
Sunrise and Sunset	68, 137, 216, 288, 373
Supply of Cotton	455
Sweating Citrus Fruits	412
Sweet Potato Weevil	184
Sweet Potatoes from Seed	234
Sweet Potatoes, The Cultivation of	90
Swine Fever, Cure for	89
	100

T.

Tangletoe	304
Teak Planting in Burmah	437
Teat, Closing of the	398
Teats, Sore	69
Teats, Warts on	304
Technical Education	201, 289
Testing Dip Solution	367
Texas Fever	293
Textile Progress, German	197
The Angora Goat	95, 320
The Automobile on the Farm	24
The Butter Trade, Will the War Affect it?	387
The Cost of Growing Wheat in New South Wales	301
The Cost of Growing Wheat in South Australia	317
The Cotton Boll Weevil	361
The Cotton-growing Movement in Queensland	357
The Cotton Worm	40, 195
The Cultivation of Sweet Potatoes	89
The Dairy Herd—Queensland Agricultural College	167, 246, 329, 397
The Estimated Wheat Yield of Australia for 1903-4	264
The Export of Queensland-grown Fruit... ..	112
The Extermination of Rabbits	110
The Firestick on the Farm... ..	163
The Flax Industry of New Zealand	242
The Indigenous False Ginger	118
The Largest Dam in the World	301
The Motor-cultivation to make British Corn-growing profitable and the Harvest Safe in Wet Seasons	82
The New Entomology	186
The New Varieties of Potatoes	147, 377
The New Zealand Flax Industry... ..	242
The New Year	1
The Papaw	41
The Possibilities of Ramie	414
The Potato Boom in England	77
The Potato Boom, Will it Last?	242
The Price of Sea Island Cotton	413

	Page.
The Probable Wheat Yield of 1903-4	4, 264
The Queensland Saddle-horse and How to Breed it	25
The Racecourse in Connection with the Thoroughbred	104
The Scarcity of Binder Twine	95
The Sea Islands	413
The Storing of Mangels	87
The Supply of Cotton	412
The Training of Forest Officers	46, 68, 339
The Use of Carbon Bisulphide as an Insecticide	211
The Vision of Reptiles	386
The Use of Paris Green	71
The Weather, Simple Method of Forecasting	431
The Wheat Harvest of 1904	378
The Wheat Yield of Australia for 1904	264
The World's Vintage of 1903	32
Thoroughbred, The Racecourse in Connection with the	104
Threshing Cotton	399
Threshing <i>Paspalum dilatatum</i>	137
Tick Fever, Remedy for	297
Timber Slide	446
Time to Plant Potatoes in the Roma District	135
Times of Sunrise and Sunset	68, 137, 216, 288, 373, 455
To Banish Silver Fish	135
To Get Rid of Couch Grass	303
To Increase Valuable Potatoes	241
To Make a Foster-mother	135
To Mend Cracked Crockery	218
To Milk Suppliers	320
To Pickle Pork and Hams	133
To Tell the Age of Fowls	109
Tobacco Notes	120, 199
Tomatoes from Seed to Fruit	135
Tomatoes, Manure for	81
Topography of a Horse	175
Training of Forest Officers	46, 68, 338
Training of Young People on the Farm	3
Trees, A Device for Planting	63
Trees, Watering	366
Trees, Working over Mango	28
Trial of Motor-binders in Wigtonshire	6
Trinidad, Cotton Gins in	412
"Tristeza," or Texas Fever	293
Tropical Agriculturist, Prize Essays	301
Tropical Coast Lands, Pasture for	137
Tropical Industries	38, 120, 188, 269, 347, 399
Tropical Plants Suitable for North Queensland, Notes on	358
Two Showy Bauhinias	267

U.

United Kingdom, Cotton Import into the	253
United States of America, Poultry in the	66
Urine, Fixing Ammonia from	418
Use of Carbon Bi-sulphide as an Insecticide	211
Use of Paris Green	71
Useful Information for Farmers and Fruit-growers	255
Uses of Cotton Seed	196

V.

Valuable Potatoes, To Increase	241
Valuable Sugar-canes	361, 430

Valuable to Vignerons	...	Page.
Vegetable Pathology	...	218
Vintage of 1903	...	126
Vision of Reptiles	...	32
Viticulture	...	386
	...	32, 265

W.

War, Will it Affect the Butter Trade?	387
Warts on Cows' Teats	304
Wasted Garden Manures	119
Water-proofing Canvas	219
Water Culture	174
Watering Trees	366
Wattle Bark, Natal, for Australia	132
Weather, Simple Method of Forecasting	431
Weed Exterminator, A New	149
Weevil, The Sweet Potato	234
Weight of a Bale of Cotton	412
Weight of Cotton Lint per Acre, How to Estimate the	411
Weirs, Living Willow	91, 450
Westbrook State Farm, Wheat Experiments at	317
West Indian Cotton at Liverpool	43
Wheat, Cost of Growing, in New South Wales	301
Wheat, Cost of Growing, in South Australia	317
Wheat Crop, A Profitable	13
Wheat Experiments at Westbrook State Farm	317
Wheat Harvest of 1903-4, The Probable	4
Wheat Harvest of 1904	378
Wheat Harvesting on Sundays	149
Wheat, Pickling, with Formalin	384
Wheat Yield of Australia, Estimated, for 1903-4	264
When to Plant Potatoes in the Roma District	135
Whipping Cotton	303
White Carrots as a Fodder for Dairy Cattle	170
White Leghorns	304
Why Farmers Should Grow More Poultry	253
Why has Australian and New Zealand Butter Fallen in Price and not Danish?	247
Wigtonshire, Motor-binder Trials in	6
Wild Oats and Sheep	317
Willow Weirs	91, 450
Will the Potato Boom Last?	242
Wine "Fakers," Roman	366
Wines, Australian, in England	132
Winnowing Machine, A Cheap	135
Wistarias	119
Wood Pulp and Wood-pulping Machinery	44
Words in the English Language	217
Working an Incubator, Hints on	331
Working over Mango-trees	28
World's Vintage of 1903	32
Wounds from Rusty Nails	302

Y.

Yield of Butter, Milk, and Cheese per Cow	70
Young People, Training, on the Farm	3

INDEX TO PLATES.

	Page.		Page.
The Hon. Digby F. Denham, M.L.A., Home Secretary and Secretary for Agriculture, <i>Frontispiece</i> .		Little Millet	134
Dairy Cattle at Dugandan	20	Turkish and South African Mohair	168, 169
British Thoroughbred Horses ... 26, 104,	178	<i>Ithyphallus operculatus</i>	264
<i>Leucosmia Chermideana</i>	35	<i>Bauhinia scandens</i>	267
Functions of Food and Hoven	53	<i>Fourcroya gigantea</i>	281
Stump-pulling Machine	65	Castor Oil Plant	284
A Scrub Road in the Maroochy District	84	Oil Mill	285
Brush Land before and after Goating ...	95	A Row of Resistant Cotton in a Diseased Field in America	303



THE HON. DIGBY FRANK DENHAM, M.L.A.,
Home Secretary and Secretary for Agriculture.

The new Secretary for Agriculture and for the Home Department was born at Langport, Somerset, England, in 1859, and was educated at the local Grammar School. He arrived in Australia in 1881, and spent four years in business as a wheat buyer in South Australia. In 1885 he came to Queensland with his brother to commence a business as produce merchants. Mr. Denham is also Chairman of Directors of the New Swanbank Colliery Company, and a leading shareholder in the Silverwood Dairy Company. After some preparation for political life in local government institutions in the State, he contested the Oxley Electorate, rendered vacant by the death of Mr. S. Grimes, and was returned by a large majority. Consequent upon the change of Ministry last year, Mr. Denham accepted the portfolios he now holds of Home Secretary and Secretary for Agriculture in the Morgan Ministry.

The New Year.

The new year, 1904, which is ushered in to-day, opens with great promise. At the end of the year 1902 it would have been impossible to foresee the marvellous change which has been made in the appearance of the country during 1903. The long-continued drought had devastated the land from the coast to the Western border. Grass and water disappeared, and, in some districts, the very trees were killed, owing to want of moisture. Cattle and sheep died by tens of thousands, and over three millions of money were spent in importing wheat and flour, as well as fodder, to keep life in the starving flocks. Many old colonists believed that grass would never spring again on the Western plains, as both roots and seed were supposed to have died. Queensland, indeed, passed through a terrible ordeal. At last the welcome rains came, and, at the beginning of 1903, hope revived in every breast. Gradually the life-giving showers spread from the sea to the border, and activity once more reigned on farm and station. Large areas of land were placed under cultivation, and starving stock were brought back to their old homes from distant pastures, whither they had been sent in the hope of their tiding over the terrible season. The soil, owing to the unaccustomed rest it had so long enjoyed, appeared to recover new vigour. Crops of all kinds grew rapidly, and the whole face of the State was once more clothed with rich verdure. The old, valuable grasses—especially the Mitchell—reappeared; and to these were added several new varieties of succulent grasses and herbs which had not before been known to exist in the State. The welcome rains, fortunately, came at the right time for sowing wheat and other cereals. Seed-wheat and barley being very scarce, the Department of Agriculture purchased largely in South Australia, and supplied the farmers with their requirements at cost price, plus expenses. The result has been such a harvest as has not hitherto gladdened the hearts of the farmers. Nothing occurred to interfere with the growth of the plants, except at the time when wheat and barley were nearly ready for harvesting. Then thunderstorms and rain came on, which, however, did comparatively little damage. Caterpillars also appeared, but too late to materially injure the crops. Rust, also, was very little in evidence. Fine weather then ensued, and all was bustle and activity on the farms. Harvesting soon became universal, and, at this time of writing, the whole of the grain is either stacked or threshed, and much has already been marketed at fair prices. It is, of course, too soon to state definitely what the total yield has been, but it is generally agreed that it will be found to amount to 2,500,000 bushels. We have reliable accounts of yields ranging from 25 bushels to as high as 50 bushels, and even more, per acre; and, considering all circumstances, it will be surprising if the average yield per acre does not reach higher than 20 bushels. Now, the maize crop is coming on. Although much of the early maize was eaten down by the caterpillars, yet there was ample time to re-sow the destroyed areas, and, as the season has been all that could be desired, there will, doubtless, be a record crop of this valuable cereal.

Grasses and lucerne have thriven phenomenally. *Paspalum dilatatum* has, in some cases, attained a height of from 7 to 9 feet, and lucerne 7 feet high was exhibited at a show in December.

All other crops have done similarly well, and, with good markets and reasonable prices, the farming community should be in a better position to-day than ever they were previously. With between £300,000 and £400,000 to the wheat-growers' account, and, probably, £200,000 for maize, in addition to the returns from hay-crops, potatoes, fruit, grapes, tobacco, &c., &c., rarely has a year been so prolific as the year 1903.

What the sugar crop will be for the season just brought to a close, we cannot say, but that it will be very satisfactory cannot be doubted. The young cane, also, has made such splendid growth that, all being well, there will be a record output of sugar by the end of the present year. The tale of prosperity is not complete without a reference to the dairying industry, which will, without any doubt, become ere long one of the greatest of Queensland's rural industries. Notwithstanding the great losses in dairy stock sustained by the farmers during the drought, milk, cream, butter, and cheese are abundant. The various factories are all in full work on the copious supplies daily being sent in to them. In the first week in December over 6,000 boxes of butter were exported by the first vessel of the Aberdeen line to come to Brisbane—the "Damascus." Pastoralists are also rejoicing in the splendid season, and are doing all they can to replenish their depleted flocks and herds. Fat cattle are plentiful; the lambing has, generally, been exceptionally good; and everything points to as speedy a recovery of the pastoral industry as Nature, combined with human exertion, will permit.

Taking, then, a comprehensive view of the agricultural and pastoral position at present, that position is one which cannot fail to inspire confidence in the great resources and marvellous recuperative power of the State. Everything points to another splendid season, and we sincerely trust and believe that when we next year wish our readers a Happy New Year, it will be with the same reason for doing so as we have to-day.

EXTERMINATING ANTS.

A correspondent of the *Sydney Morning Herald* says that if chalk is rubbed on the bark of a tree it will absolutely prevent them from climbing. If they are above it, they fall the instant they set foot on the chalk when descending. They appear to lose their foothold. He mentions his experiment with a nectarine-tree, which was covered with black aphids. Observing that there was a continuous stream of black ants ascending and descending, he smoothed the bark of the stem to a width of about 6 or 7 inches, and rubbed this space with chalk. The chalk was renewed from time to time as it fell or was washed off. That year there was not an aphid or black leaf on the tree, nor have there been any since. The ants, cut off from their food supply, were exterminated. A chalk ring drawn round a sugar-ant's nest is (says the writer) equally effective. We have so many times been asked how to get rid of ants, that we advise those troubled with them to see if there really is any virtue in chalk to repel them.

Agriculture.

THE TRAINING OF YOUNG PEOPLE ON THE FARM.

We commend to our young readers, especially sons of farmers, the following address delivered by Judge Henry M. Furman, U.S.A., before a farmers' institute in that country. So many able-bodied, healthy young fellows brought up to work in the free, open air of the country abandon that healthy life because they think farm labour beneath them, or too hard, or too ill-paid, in order to become civil servants, clerks, lawyers, school teachers. They have succeeded in passing an examination, either the civil service or scholarship examination, and forthwith they seize the first opportunity of abandoning the grand old occupation of their fathers—an occupation which has kept them in comfort, in food, clothing, shelter, and which has provided them many pleasures and healthy employment—for what? A paltry salary which will not suffice to keep them in food and lodging unless helped by their relatives. They exchange the healthy country air for the vitiated atmosphere of a city office and of city streets. They spend years of their young life in drudging at a desk, and at the end of several years they rarely attain such a salary as will enable them to do more than live at a boarding-house and keep themselves respectably.

Farm life has its ups and downs. Farmers have to contend with great difficulties in the way of droughts, floods, pests of various kinds; yet how many farmers' names are seen in the lists of insolvents? How many farmers throw up their farms and take to city life? Very few, certainly none who have settled on the rich lands of the Darling Downs, or on the Logan and Albert, at Oxley, Rosewood, and scores of other agricultural centres. If the young men reared on the farm would only look round them and take note of the hundreds of young fellows in the cities who are drudging for a pittance of from £50 to £100 a year, most of which is spent as soon as earned in the necessities of life, they would certainly pause before joining the overcrowded ranks of city clerks and civil servants.

The address, which is condensed by the *Florida Agriculturist*, is as follows:—

Just after the war, labour was on a slave basis for many years in the South. For this reason labour was considered degrading. "Farming was a slave's business." No man of education or ambition was satisfied to farm. We are living to learn that this idea was all wrong. My friends have often heard me say that I expected to spend my last days on the farm. Farming has always been a paying business to those who followed it with business-like method. I believe it always will be. Farmers must not only consider how they may get pay for labour, but they must interest the boy in farming. The boy must have his heart and taste cultivated and developed for farm life. Love lightens labour. Work becomes a pleasure and not a burden to him whose interest is centered in that work. One of the first steps then is to attract the boy to the farm work, and get him in love with it.

Our boys must be taught to glorify agriculture. They need to get a true conception of the dignity, freedom, independence, and many advantages of farm life as it is lived by thousands in this day of literature, science, and the conveniences that bear upon farming. The Bible says that the "husbandman that laboureth shall be the first partaker of the fruits." If this is not so, something is wrong, because it has been so declared by Holy Writ. My friends, agriculture is the only occupation followed by Divine command. By this I do not mean cotton and corn, but the cultivation of the soil with all the fruits thereof. Let us ask ourselves why it is that our agriculturists are not the first partakers of the fruits. For more than a generation past the

bright boy has been trained to make a preacher, a lawyer, or a teacher, and thus we have degraded farming. You injure your boy when you teach him that the farmer is inferior to men of other callings. The worst idea that you can give your boy is to teach him that he is too good to work. Tell your boy that labour is honourable, and that it is the price of joy. The Bible says, "Rejoice in your labour, it is the price of joy." The man who cannot respect the dignity of labour, the man who does not employ himself thoroughly, knows nothing of enjoyment.

Out of every ten who begin the practice of law (and I am a lawyer), nine fail. Take the medical men, and it is the same way. Ninety-five per cent. of the merchants fail, but in my observation no young men of intelligence who have devoted their lives to agriculture have failed. For such, there is no such thing as failure.

One of the most pitiable sights seen in our southern country (I am a Southerner, and speak as a Southern man) is the shabby gentility of most of the people who live in town. They live out of paper bags. You do not know what burdens these people carry around with them, all because of the false instruction received from their parents in their childhood. A boy can work on the farm and make more money than these young men in town, and, another good thing about it is, he don't have to lie about the cost of the goods he is selling, and when he goes to bed at night he respects himself, because he has not been spit on and clawed over by the boss man in the store until life is a burden.

The people on the farms of this country must get over the idea that labour is a curse. As a Southern man I rejoice that slavery is no more. We are learning that it is suicidal to make cotton our main crop. Our farmers must learn to manufacture their farm products into meats ready for consumption, into fruits that tickle the palate of the Northern purchaser. I was glad to hear Mr. Warren discuss the profit he made on hogs and alfalfa here in this section. There is more money to be made than Mr. Warren has gotten out of the business, and it is not likely to be overdone. To go into this line of work means independence for the farmer. To do this systematically we must begin to teach the boys that agriculture demands the best intelligence that the country can command. Teach him that the only fellow to be looked down upon is the idle man with either idle brain or with idle hands.

THE PROBABLE HARVEST OF 1903.

In our September (1903) issue we set down the probable yield of wheat for 1903 at 2,200,000 bushels, which would come within 1,500,000 of the State requirements. In this connection, the following figures, which we take from the *Brisbane Courier* of 1st December, will be read with interest:—The daily output of bread within the ten-mile radius, Brisbane district, is about 45,000 loaves (2 lb.); multiply by thirty days, gives 1,350,000 for a month. This would require 10,228 bags of flour, equal to 1,023 tons, which, if multiplied by twelve months, would give for a year 12,276 tons; and estimating an addition of 10 per cent. for flour used by pastrycooks, grocers, and household—1,228 tons—gives a total annual flour consumption for Brisbane and district of 13,504 tons. It takes 50 bushels of wheat to produce 1 ton of flour, or a total of 675,200 bushels for the annual requirements of Brisbane and district. The district mentioned contains about one-fourth of the total population of the State, so that the requirements of the State of Queensland on the above basis (which may be assumed to be fairly accurate) would be 2,700,800 bushels for food requirements per annum. Seed requirements would bring up the total Queensland demand to considerably over 3,000,000 bushels.

This shows that with a crop of 2,200,000 bushels the State would be only 800,000 bushels below her requirements. As the harvest proceeds, it seems highly probable that the limit of requirement will be reached, as, so far as can be seen at present, the estimated yield of 20 bushels per acre will be exceeded; 120,000 acres, with an average yield of 25 bushels per acre, would bring the grain harvest exactly up to our needs, both for consumption and seed purposes for next crop.

Taking the wheat crops of all the grain-growing States of the Commonwealth, we anticipate the yield at about 60,000,000 bushels, although the late rains in the Southern States have to some extent damaged many promising crops.

Should this forecast be realised, the Commonwealth States will have about 35,000,000 bushels for export. This means nearly 1,000,000 tons. Putting the export value at 3s. 2d. per bushel, about £5,500,000 sterling would be the value of the exported grain. Last year some £3,000,000 was paid for imported grain and flour. Putting these two items together, the combined States stand to be between £8,000,000 and £9,000,000 better off than in 1902.

We are here only sizing up the wheat crop. The barley, maize, oats, potato, and fruit crops, not to speak of the excellent sugar returns, promise equal results. We may, therefore, well point to agriculture as being to-day in a most flourishing condition.

AGRICULTURE IN OUR COMMON SCHOOLS

is the text of a paper read by another American professor at Long Beach, U.S.A. All over the United States of America it is recognised that agriculture in all its branches, including stock-raising, fruitgrowing, dairying, etc., is the mainstay of the great republic, and hence the constant cry for the teaching of agriculture in the State schools.

Professor J. H. Reed said:—

In seeking for the reasons of this slow progress among the agricultural masses, I think a valuable hint may be had from some of the more progressive agricultural countries of Europe, where they commence their agricultural education in the common schools. In the little country of France, less than half as large again as California alone, agriculture is taught in over 3,000 primary schools. Seventy-seven experiment stations are maintained, besides the nine National schools of agriculture. Doubtless the high condition in which farming is found in all the principal agricultural districts of that country is largely the result of these agricultural schools and experiment stations, but the interest in them was first aroused in the common schools.

Provision for technical education in our grammar and high schools is rapidly, and deservedly so, becoming popular all over our country. Large sums are allowed for equipment. Thousands of children become familiar with the nature of materials and expert in handling tools, greatly to the advantage of those who choose mechanical trades later on, while practically no attention is given to the occupation in which one-half or more of our people, sooner or later, find their life work, till a scattering few make their way to the agricultural college. It is as practical to teach children the character of soils, of plant life and growth, and to equip for the illustration of these, as to teach and equip for illustrating the mechanical trades or domestic arts. This primary training in our public schools would not only result in greatly increasing the number in our agricultural college, but would result in interesting many who go direct to the farms in the practical work of the experiment stations.

ENSILAGE.

At a meeting of the Gladstone Branch of the Bureau of Agriculture of South Australia, Mr. D. D. Smith read a paper on silos and ensilage.

Local circumstances, he said, must determine what materials can be most economically utilised in building the silo. Where plenty of gravel and sharp river sand is available, concrete walls, made of 1 part good lime to 4 parts sand and gravel, cannot be excelled. Division walls should be 2 feet thick, but 18 inches will be sufficient for the outside walls of the pit. The walls should be plumb, and as smooth as possible, but cement will not be necessary. The walls and bottom of the pit must be air and water tight. Small silos are not so effective as large ones; the green stuff cannot be packed so well against a rough surface, and there is more waste with small pits. A pit of useful size would be 20 feet long by 12 feet wide, and 15 feet deep; it would hold about 75 tons of green fodder. Where good holding ground is available, a pit can be excavated and fair success attained without going to the expense of building walls of masonry; small farmers need not hesitate to make a pit of this description and convert the surplus green stuff into ensilage. There were two classes of ensilage—sweet and sour. The sour ensilage was of a pale greenish yellow, with a slightly vinous odour; sweet ensilage was brown, and possessed a sweet smell. The former was best for milking stock, and the latter for fattening purposes. The crop for ensilage should be cut when full grown, but not ripe. For sour ensilage cart immediately, and fill the silo as quickly as possible, and apply the weights. The temperature will rarely exceed 80 degrees Fahr., and little or no fermentation will take place. If sweet ensilage is desired, leave the crop on the ground for a day or two, and fill slowly, allowing the temperature to rise to 125 degrees Fahr. to 150 degrees. If the fodder is too wet or the filling goes on too quickly, the temperature will fail to rise sufficiently. When the temperature is sufficiently high, add more green stuff, or put on weights until it goes down to about 90 degrees Fahr. In filling the silo take care that each layer of fodder is horizontal. When filled place planks about a quarter of an inch apart across the short way of the pit; the planks should be half an inch shorter than the width of the pit. Put on 2 cwt. per superficial foot in weight; stones, concrete, blocks, logs of wood, or bags of sand or earth may be used for this purpose. When the ensilage is required for use, remove only sufficient of the planks to give room to cut it; cut in a vertical direction, as in a haystack, and remove only enough for each day's use. Do not remove the weights from the uncut portion until necessary, as the pressure should be kept on as long as possible. Considerable discussion ensued. Members generally agreed that all feed possible should be conserved for use when other food was scarce. In connection with stack ensilage, members thought that much weight would not be required.

[It is now generally conceded by experts in silos and silage that weighting after filling the silo is quite unnecessary. A covering of straw or any rough grass is sufficient.—Ed. *Q.A.J.*]

MOTOR-BINDER TRIALS IN WIGTOWNSHIRE.

Encouraged by the success which has attended the introduction of the "Wood's" binders into Wigtownshire, and the many orders which they have booked for the present and next season, Messrs. Henderson and Wither, agricultural implement agents, Stranraer, arranged with Messrs. Walter Wood and Co., motor harvesting and mowing machine manufacturers, Hoosick Falls, New York and London, for a series of practical demonstrations with their petrol-motor reaper and binder on farms in the parishes of Portpatrick, Stoneymark, and Inch. The motor has recently been operating with marked

success in the counties of Essex and Kent, cutting and binding about 100 acres of wheat and other grain. The present series are the first in Scotland with the motor-binder, and the operations have been watched with considerable interest. The first trial was intended to take place on a certain day at McCubbin Hill, near Dunskey Lake, but, as this ground was only recently broken up, it was considered too rough for the mechanism of the binder. The first trial was transferred to a field on the farm of Pinminnoch (Miss Kerr's), near Portpatrick, and was successfully carried out two days later. The motor-binder weighs 24 cwt., has a cutting breadth of 6 feet, and, as a horse is required for guiding purposes, the speed with seated drivers may be regarded as almost 4 miles per hour; therefore the cutting capacity of the motor can be calculated as considerably in excess of the ordinary reaper. The field selected for operations had a fair average crop of Birley oats, but with a heavy bottom of damp grass, and the ground was of a hilly nature. The binder was in charge of Mr. Oliver Arter, engineer, Barham, Kent. The grain was cut very clean, but during the forenoon the delivery of the sheaves was hampered by the grass, only the heads being sufficiently dry. As the day advanced the crop became drier, and during the afternoon excellent work was done in cutting and binding, the sheaves being strong and well balanced. Those who expected to find the binder working without a horse to steer were evidently disappointed, but this objection will be overcome in the new motor-binder which is being prepared for next season. The proportions will be increased to 10-horse power, with a cut of $8\frac{1}{2}$ feet and a speed of 8 miles per hour, while the adoption of four wheels and complete steering-gear will leave the binder independent of a horse for guidance. Operations at Pinminnoch were continued for over four hours, during which a large number of agriculturists and others were present. The general opinion was that the binder was capable of doing good work. It would be difficult to judge of the future of motor-binders in this country. On small farms they are not likely to replace the present system, but their adoption for general cutting and binding, on much the same lines as the threshing-mills which travel from farm to farm, is not improbable. Messrs. Henderson and Wither deserve to be congratulated on the enterprise they have displayed in having these demonstrations carried out in a district which is largely agricultural, and which is, doubtless, as open to the introduction of progressive ideas as any part of Scotland. Its agriculturists have certainly taken a leading place in all that pertains to the advancement of the province of Galloway as a farming district, and have proved deservedly successful.—*Agricultural Gazette*, London.

NOTES ON MANGELS.

Readers of agricultural literature cannot fail to have been highly interested in the reports which have regularly appeared on various experiments carried out in connection with field crops at the Rothamsted Experimental Station at Harpenden, England. Whilst such reports have appeared on the continuous growth of wheat on one field, from which fifty-nine successive crops have been taken; on barley in another field, where fifty-one successive crops have been grown; on hay in the Park, now in its forty-eighth year, besides reports on the successive cultivation of the same crops of beans, clover, turnips, swedes, sugar-beets, &c., the results of the experiments upon the mangels, which succeeded the sugar-beets in 1876, have never been wholly published.

The leading features brought out, and some of the crop returns, were summarised in a lecture delivered by the late Sir Henry Gilbert at the Royal Agricultural College at Cirencester in 1887, and again in his lectures delivered in America in 1893, and reprinted in the Transactions of the Highland and Agricultural Society of Scotland, Vol. VII., 1895.

For many years past the Barn Field, where the mangels are growing, has been one of the most interesting of the experimental fields at Rothamsted, both as regards the practical lessons to be drawn from the various plots and the many scientific questions raised by the results. The writer had the privilege of being conducted by the late Sir Henry Gilbert round the mangel plots as recently as the record crop of 1900; there must be many others who retain the recollection of similar visits, and of the intense interest, even the enjoyment, with which Sir Henry expounded the results as he passed from plot to plot in the field. It is perhaps but fitting that in this, the first paper issuing from Rothamsted since his death, the writer can be little more than the mouthpiece of the conclusions which he was fortunate enough to be able to gather from their source even in so small a degree.

The mangel differs in several essential respects from the other root crops grown upon the farm; it is suited to both hotter and drier climates than either swedes or turnips. It can conveniently be sown at an earlier date, so that in the south and east of England, at any rate, it is easier to secure a good plant, which, once established, is much better able, by its deeper rooting habit, to withstand, and even to flourish, in droughts that would seriously injure the prospects of the swede crop. In consequence, it is possible to grow far heavier crops of mangels than of swedes in most parts of England, no other crop, indeed, yielding so large a weight of dry matter per acre. The mangel possesses a greater development of leaf in proportion to the root than does the swede, though it falls below the common white turnip in this respect. It also roots more deeply, and throws off fewer roots near the surface, so that it searches the subsoil very thoroughly for food and water. The mangel has been derived by cultivation and selection from the wild beet (*Beta maritima*), a typical seaside and salt-loving plant, and it still shows its ancestry in its dependence upon large supplies of saline constituents in manure, and in its toleration of soils containing amounts of alkaline salts which would injure ordinary vegetation.

Considered from the standpoint of its after use as a food for stock, the mangel contains a rather higher proportion of dry matter than either swedes or turnips, and this dry matter consists mainly of sugar; in fact, the mangel must be regarded as essentially a sugar crop. As a rule there will be, in the 12 to 14 per cent. of dry matter in the mangel root, sugar accounting for 8 to 10 per cent.; in swedes the proportion of sugar is only 4 to 7 per cent., but in the sugar-beet proper it rises to 16 or 18 or even 20 per cent.

At Rothamsted it was found impossible to continue the growth of swedes upon the same land year after year with any success. In Sir Henry Gilbert's words this was "mainly due to the incidental circumstances that in growing the same description of crop, with the same comparatively limited and superficial root-range, for so many years in succession, the surface soil became less easily worked, and the tilth, so important for turnips, was frequently unsatisfactory: whilst for want of variety and depth of root-range of the crop, a somewhat impervious pan was formed below."

At the outset of the trials with mangels it was thought not unlikely that a similar difficulty would be experienced, and that after a time the soil would be rendered unsuitable for the further growth of the crop. This has, however, not proved to be the case; the crop, except on the continuously unmanured plots, has shown no tendency to deterioration when the later periods are compared with the earlier; indeed, the twenty-fifth crop, that of 1900, was the best of the whole series, and the last crop in 1902 has also been exceedingly good. Doubtless the deep-rooting habit of the mangel, and the fact that its roots are not specially confined to any particular layer of soil, helps to render this continuous growth possible. Something also must be attributed to the freedom of the mangel from insect or fungoid attacks.

The pamphlet from which we derive our information on this subject is written by Mr. A. D. Hall, M.A., and first appeared in the journal of the Royal Agricultural Society of England in 1902.

Our space will not permit of the reproduction of the whole of this interesting paper. The general conclusions arrived at by the experiments on mangels are as follow:—

THE CROP AND SEASON.

The mangel crop varies from year to year to a greater degree than do most of the other staple crops of the farm, this being doubtless due to its comparatively short period of growth and its dependence upon suitable weather conditions at the critical time of germination. If the subsoil has accumulated a reasonable supply of water in the winter and early spring, it is generally recognised that a hot season, even accompanied by periods of drought after the plant has been established, is most favourable to the growth of mangels.

Attempts, however, to correlate the weight of the crop with the records of rainfall, temperature, and sunshine at Rothamsted, for the portion of the year during which the crop occupies the ground, have failed to give any results of general application, even when the observations are grouped into weekly periods from the date of sowing to that of lifting the crop. In the first place, everything depends upon securing a good plant soon after the seed has been sown, and the critical conditions of tilth, moisture, temperature, and evaporation, which prevail about the time of seeding, are too minute and intricate to be capable of deduction from the ordinary meteorological observations. Even when a good plant has once been obtained, it is difficult to trace from the records what have been the dominant factors in producing a large or small crop. For example, the best mangel crop at Rothamsted was grown in 1900, a year of comparative dryness, great evaporation, and much sunshine; the current year, 1902, has given a crop but little smaller, yet the character of the season has been entirely different, for it has been a cool summer, with much cloud, little sunshine, and frequent though small rains, except for one period of heavy rains towards the end of August and beginning of September.

Putting aside the question of failure of plant, even in the good seasons and on the dunged plots where germination is assured, no systematic connection can be traced between the weight of crop harvested and the records of temperature, rain, sunshine, &c. The meteorological observations made at present do not enable one to estimate the prevalence of what the farmer knows as "good growing weather."

GENERAL CONCLUSIONS.

Looking at the results of the experiments at Rothamsted on the continuous growth of mangels with various manures for twenty-seven years from the point of view of the practical farmer, the following general conclusions can be drawn:—

- (1) That mangels can be grown continuously on the same land without injuring the tilth of the land or the health of the crop.
- (2) That a liberal dressing of farmyard manure forms the best basis of the manure for mangels.
- (3) That the crop will further respond to considerable additions of active nitrogenous manures to the dung, particularly of nitrate of soda.
- (4) That a free supply of potash salts is essential to the proper development of the mangel, hence a specific potash manuring is desirable, even when dung is used in large quantities, and on a strong soil initially rich in potash. When nitrogenous manures are used in addition to dung, the potash salts should be increased *pro rata*, in order to maintain the health and feeding value of the crop, and to bring it to maturity.

- (5) That, in conjunction with dung, superphosphate or other phosphatic manure is hardly necessary, and will give little appreciable return, especially when the crop is grown in rotation.
- (6) That, as soluble alkaline salts are beneficial to the mangel crop, either as direct foods or as economisers of potash, a dressing of salt should always be included among the manures for the mangel crop.

From the above extracts it will be seen that mangels will thrive on a soil so alkaline as to destroy other vegetation. There are many alkaline patches on farms in Queensland, which are never cultivated, but where, as at the Hermitage State Farm, near Warwick, mangels were grown, the crop was very heavy, and the land, deemed by some to be useless, has been proved to produce heavy crops of this root.

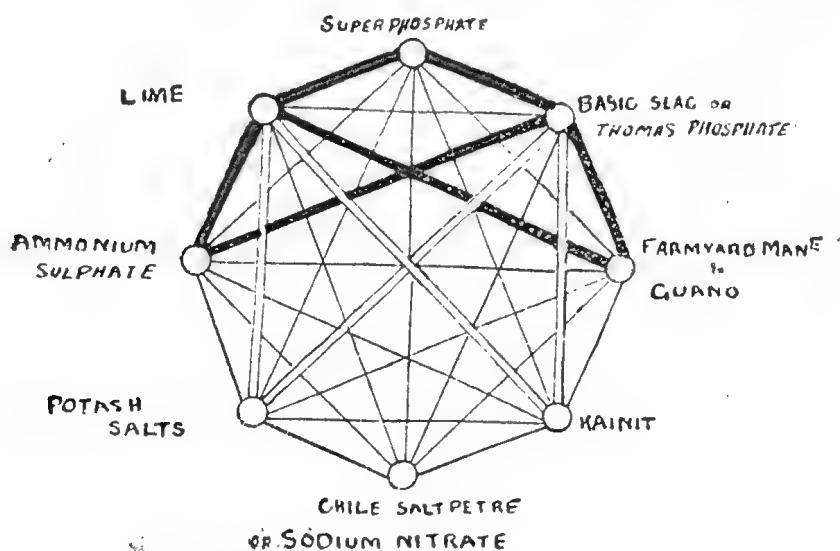
MANURES, AND HOW TO MIX THEM.

Dr. Geehens, of Alzey, Germany, has furnished a very simple plan of determining what artificial manures may be mixed, and *vice versa*. From the *Australian Agriculturist* we take the following notes and accompanying diagram:—

In mixing manures before applying same on the land, chemical changes can take place, so that a valuable ingredient may be lost by a part of it flying off as gas, as example, the mixing of lime manures with such that contain nitrogen, as stable manure, guano, or ammonium sulphate, when the most valuable ingredient, the nitrogen, is lost in the form of ammonia; or an easily soluble manure changes into one difficultly soluble, and so loses in value, as example, the influence of lime on easily soluble phosphates.

Secondly, mechanical changes can be caused by mixing two or more manures, and so make their application more difficult, and consequently more costly. Mixing kainit or other potash salts with other artificial manures, if not spread immediately, will give a mixture that soon becomes a hard, solid mass, which must be broken up before application.

To remember what manures can be mixed for any length of time, shortly, or not at all, before spreading the same on the land, cannot be expected of anyone who is not well up in the chemistry of manures. The accompanying diagram, which can be relied upon, is valuable for reference. For this purpose



MANURES AND HOW TO MIX THEM.

it can be tacked on the barn door, and everyone can see at a glance what manures can be mixed, and how long before spreading same on the land.

Those manures joined by the thick lines must never be mixed before using; those by the double line, immediately before spreading; and those by the single line can be mixed together at any time.

AGRICULTURAL EDUCATION IN SCHOOLS.

An appendix to the report of the superintendent of the Botanic Station, British Honduras, gives the substance of a lecture on the above subject, given by the superintendent (Mr. E. J. F. Campbell) on the above subject. From it we take the following extracts:—

Physical and mental health should be the supreme aim of the elementary teacher.

It is of great importance that the use and exercise of body and mind in the elementary stages of children should be pleasurable and joy-giving; half an hour a day may be spent in the school garden among some sort of plants and flowers; the handling of gardening tools, &c., would even be of considerable benefit. The power of joy has then an expanding and inspiring influence—in fact, it is absolutely essential to the wellbeing of all children.

The child is much influenced at this period by its emotions and feelings.

Teachers should realise that it is only by experience through the various senses that the sensory areas of the brain can be modified. A child's energy and force depend upon the character of the brain—the supreme centre. Nature study is the only brain builder.

It is not intended here to outline any particular course, but what is meant is just to open the minds to the requirements of agriculture and agricultural training, to give some idea of this wonderful science.

The system now of teaching and the curriculum now laid down by the education authorities is undoubtedly good, but so far as agricultural education is concerned, there is room for much improvement. What is desired is an education in our schools by which the children may be instructed in those matters which will be of particular service to them as farmers; and I am sure the introduction of Agricultural School Readers, giving the principles of agriculture and forming a continuous upward course of information, would be of great value, attraction, and interest. Object lessons—school gardens attached to the school grounds, where the rudiments and elementary science of agriculture could be demonstrated and practically illustrated also—prove of the greatest value in the education of the rising and future generation. Then let us, one and all, endeavour to make an effort in providing a progressive initiation in introducing agricultural education, and let the first principles of agriculture be one of the features in our schools.

It must be borne in mind that what is aimed at is the educating in the science and practice of agriculture, and the training of the young mind to the study of Nature, so that the natural surroundings of our young may present new beauties and fresh interests and possibilities to them, and reconcile them to the so-called monotony of a country life.

To most of our people the germination, development, and reproduction of vegetation are a mystery, and the realisation that plants are living and breathing organisms, performing all the vital functions of such, must come as a great revelation to the majority of our rural friends.

A knowledge of the forces of Nature as they work through plant and soil, the wonderful adaptations of these forces, and the interdependence of the mineral, vegetable, and animal kingdoms is what is wanting. An intelligent knowledge of Nature in her various phases should be so much power in the youth of the colony, which he will be able to use to his advantage; with

such knowledge his lot will be infinitely more congenial to him, his prospects more cheerful, and his inclination will be to remain amid his rural surrounding and apply himself to the cultivation of the soil. Thus it is hoped the people of this colony will be led to develop its great agricultural resources. We trust this will be realised.

In the carrying out of the science of agriculture in any form, keen observation, object lessons, and practical training, are most essential. Agricultural education also rests on Nature study. The first thing to do with children is to impress them with the love of Nature; teach Nature in the schools.

The element of education which is most lacking in our schools is the training of the powers of observation. The children need above all things to be taught to observe carefully and correctly, and to state their observations in clear and terse language. The ordinary child, whether in the country or in the town, actually sees and knows comparatively little in the world about him. The wonders of the trees and plants around, of birds, beasts, and insects about him, float like shadowy visions before his eyes; "seeing, he does not see;" he needs a teacher who can open his eyes and fix his mind on the realities among which his life is passed. This accurate observation of actual objects and facts is the only foundation upon which scientific attainments can rest. It is for Nature-teaching that the child mind craves; with it the school becomes a delightful place, and the teacher a messenger of light.

I will give you in just one simple instance the value of object lessons and practical demonstrations: Supposing you wish to pot a plant, and you read in a book on gardening, if you have one, as follows:—

"Take up the plant carefully with a trowel, fork, or spade, remove a portion of the ball; then get a clean, dry pot; set the plant in the centre, not too deep, the collar should be just half an inch below the edge of the pot, and fill up with rich garden soil; after that water it well, and keep in the shade a few days."

Could you carry out these instructions completely without ever seeing the thing done before? I doubt it. But if I was to read that, I would understand it easily, having seen it done and actually done it.

A course for the study of agriculture must consist very largely of the principle underlying the practice—that is, the child must be taught why he plants, cultivates, and reaps, in one way rather than another, and what laws of Nature he violates in the bad management of his crops, &c.

SUNFLOWER SEED.

There is nothing more easy to grow than sunflowers, but, apart from their ornamental character, one never thinks of these plants as being of any use to the cultivator. To give some idea of what can be done with the seeds, we have made the following *résumé* of an article published in the *London Agricultural Gazette* not long ago:—

Small parcels of sunflower seed have for years reached London, but of late large consignments have arrived from Odessa, and it is worthy of note that a 300-ton cargo found a purchaser at £11 5s. per ton. This would go to show that there is a market for the seed, and assuming that 1 acre on an average will produce 50 bushels of seed, without as great exhaustion of the soil as many other crops occasion, its value as a profitable cultivation will be understood. The sunflower has been largely and profitably cultivated in Hungary, Germany, and Russia for a long time past. Not only do birds of all kinds thrive on the seed, but there is, perhaps, no more fattening seed for poultry, while cattle like it either whole or crushed. The stalks of the

plant can also be used as fodder. Speaking roughly, each seed produces a thousand. Yet it is said that the demand is greater than the supply. The hulled seeds contain—

	German Seed.	Russian Seed.
Oil	33.48 p.c.	34.25 p.c.
Organic substances	54.04 p.c.	54.39 p.c.
Protein substances therein	14.12 p.c.	18.80 p.c.
Ash	2.86 p.c.	3.56 p.c.
Water	9.62 p.c.	7.80 p.c.
	100.00	100.00

—*Tropical Agriculturist*, Ceylon.

A PROFITABLE WHEAT CROP.

We are informed by a gentleman who lately visited the Hodgson District, just before harvesting operations began, that, in conversation with a farmer who had 75 acres of fine wheat, the latter told him that he had merely broadcast the seed, harrowed it in with a spring-tooth harrow, and from first to last had only put in 16 days of labour on the crop. Reckoning the labour of horses and man at 12s. per day, this means that, with the exception of the cost of seed and harvesting, he only spent £9 12s. in labour. He estimated the crop at from 5 to 6 bags per acre. For the farmer's sake, we hope our informant was not misled. At 20 bushels per acre, sold at 3s. per bushel, the value of the crop would be £225, from which must be deducted cost of 75 bushels of seed at 8s. 6d. per bushel (if imported), £31 17s. 6d.; labour, £9 12s.; harvesting, at 6s. per acre, £22 10s.; bags, £9, a total of about £72, leaving £153 or thereabout for living and incidentals.

MALTING BARLEY.

A few years ago the question was asked: Is malting barley a paying crop for the Darling Downs? The answer was a practical one, for Mr. T. Murphy, of Swan Creek, in 1898 grew a large quantity of barley, which yielded 40 bushels per acre, and the grain realised 4s. 3d. per bushel, delivered at Swan Creek railway station. Since that time it has been abundantly proved that Queensland contains the two principal factors essential to the production of a good malting grain—viz., soil and climate. A good sandy loam is generally admitted to be the best for growing barley, but given a good rainfall at suitable intervals, almost any soil will give a good sample of grain. Virgin soil is preferable to a soil which has been repeatedly cropped, for the reason that none of the constituents required for the production of first-class barley are taken out; and we have the statement of expert maltsters that barley grown on virgin soil will make a superior malt, and, therefore, a better beer. What the farmer has to do is to produce a grain bright in colour, with a thin wrinkled skin, and weighing about 50 lb. to the bushel. The early barley harvested during 1903 suffered considerably owing to the continued wet weather when the crop was ready to cut. The grain became much discoloured, and Mr. V. C. Redwood, the well-known Toowoomba maltster, after examining twenty samples, pronounced them all inferior, and showed that the grain had germinated in the ear, and was consequently unfitted for malting purposes. The late crop, however, was of a far better kind, and possessed all the qualities the maltster requires.

Mr. F. B. Guthrie, in an article in the *Agricultural Gazette* of New South Wales, writes:—

The soil best adapted to barley is a warm friable soil; calcareous loams or soils with chalk subsoil are the very best natural soils. Such are, however,

rare in this State, and the addition of lime will probably be necessary to obtain the best results. Dry sandy and light chocolate soils are very suitable, and it will grow on poorer soil than wheat. Stiff clays are unsuitable.

The grain should be clean and free from other seeds, and from broken or damaged grain. Such broken grain becomes mouldy on the malting floor, even slight abrasions of the skin being liable to encourage the growth of mould, and render the grain objectionable for malting purposes. For this reason the threshing must be carefully done, to avoid injury to the grain; indeed, it is not advisable to attempt to dress the grain too thoroughly. The grain should be harvested before it is too ripe. The best plan is to use the reaper and binder (stripped grain does not command the same price) as soon as the last trace of green has disappeared from the ears, and to let the ears stand in stooks to mature. Grain that has been stacked is preferred by maltsters, as it is then more mellow and friable.

In order to ensure an even crop, the land must be prepared with some care, broken up to a depth of at least 6 inches, and well and evenly cultivated. Heavy manuring is unnecessary; indeed, the use of nitrogenous manures (blood, bone-dust, sulphate of ammonia, nitrate of soda, &c.) is generally to be avoided, as these produce a grain rich in albumenoid matter which is prejudicial to its malting quality, beer prepared from such malt being often cloudy and unsound. Heavy nitrogenous manuring is also objectionable, as it promotes leaf and stalk growth at the expense of the grain, which is weak and deficient in starch, and flinty.

The seed should be sown in drills, using from 40 lb. to a bushel per acre. For manure, a light dressing of superphosphate, about 1 cwt. to the acre, will give the best results, the soil having been previously limed, or about the same quantity of Thomas' phosphate.

To sum up, barley is a prolific crop, which does not require a very rich soil nor heavy manuring, and which is fairly drought-resistant. To ensure good grain for malting, the ground requires to be prepared with some care, and worked well and evenly to obtain an even grain.

In a paper read at a meeting of the Clare Branch of the Bureau of Agriculture of South Australia, Mr. Christison made the following remarks on barley-growing for malting purposes:—

He could see no reason why good malting barley should not be grown in this district if reasonable care and judgment, especially in harvesting the crop, are exercised. The soil and climate appeared to be suitable, the price for good malting barley was nearly always satisfactory, and yields were much heavier than of wheat. On suitable land for barley they could expect up to 40 bushels per acre of barley, where they would not get more than 20 bushels of wheat. Whereas wheat, as a rule, gives the farmer 2s. 6d. per bushel, malting barley rarely fetches less than 3s. 6d., making a return of £7 per acre, as compared with £2 10s. from wheat. If the barley is improperly harvested—and the harvesting is a most important item—the farmer can readily get 1s. 6d. per bushel, which would give a better return than wheat. In various suitable localities in this State crops of 40 bushels per acre of barley had been grown in the past. He did not, of course, suggest that wheat should be given up in favour of barley, but that they should give some attention to a profitable branch of farm work. The best barleys are grown on sandy loam, with a good rainfall, but, with the exception of heavy clay land, it can be grown satisfactorily on most soils; the limestone soils in this district should suit admirably. There were several varieties of barley used for malting purposes, but the two-rowed varieties were generally preferred. The best variety was the Chevalier, though a fairly large amount of Cape barley is now used for malting, and has the advantage to the farmer of a thicker skin, and is therefore less liable to damage in reaping. The greatest of care must be exercised in reaping; the barley must be dead ripe, and cannot safely be stripped in very hot weather, owing to the liability of damage to the skin, and the grains being broken by the beaters. Very little experience would

teach any observant farmer when not to strip and how to adjust the machine. It was better to have the sample too rough than too smooth, with consequent risk of injury. From the malster's point of view it was essential that the grain be plump, mature, and free from damage, as his object is to get grain with the highest possible capacity for germination; hence the necessity for care and judgment in reaping and cleaning operations. As the skin and other useless parts constitute about 30 per cent. of the entire grain, it will readily be seen that a thin skin is an important item. Thick, coarse-skinned barley carries a high proportion of waste. It is a common thing for a sample of barley to be refused solely on account of the damage done by reaping. A good sample of barley possesses the following characteristics:—Vitality, condition, maturity, good colour, also, in a less degree, size, weight, evenness, colour, appearance of skin, and age. In buying a sample of barley the maltster looks for the percentage of broken skinned and cracked grains, dirt, and foreign grain. Colour, if bad, does not necessarily condemn a sample, but shows it has been in bad company, such as wet weather or heating through reaping green. Weight, size, and evenness are all good points, but a floury, mellow interior, bright golden colour, and clean odour are the chief guides.

Another experienced South Australian grower says:—

Three kinds are usually grown, and Chevalier finds the most favour with maltsters; Scotch and Duckbill are the other sorts. A good sandy soil is generally admitted to be the best for growing barley; but almost any soil will give a good sample if there is a good rainfall. Barley requires more moisture than wheat does to bring it to perfection, as it is not so deeply-rooting a plant.

The quality of barley for malting depends a good deal on the soil. That produced on a sandy soil has a thicker skin and darker colour than that grown on a stiff red soil. Barley grown on stiff red soil has a much brighter colour. A black soil generally produces a fine sample, but it is not considered good for malting, though rich for feeding purposes.

It is better to sow with the drill than to broadcast the seed, as it is better rooted and withstands dry weather much better. About 40 lb. seed per acre is enough, and if hand-threshed a much smaller quantity will suffice.

The most important thing is harvesting. The barley can be got in with an ordinary stripper if the concave is taken away and the beaters are moved as far forward as possible without touching the comb. The edges of the beaters must be quite square, as a round edge will both skin and crack the grain, and make it of no value for malting purposes. If properly stripped, the grain should come in with the beard on. Next spread the barley on a good hard floor, and tread it with horses until the beards are broken up small, so the lot will run easily through the winnower. Rolling with the ordinary land roller will take off the beards, but not so satisfactorily as with horses. Winnow once, and put away in bags in a cool place until the maltster wants it, then winnow again. This improves the weight and colour of the barley, and removes any odour which sometimes attaches to grain bagged too soon after stripping.

Good malting barley will always command a good price, and there are these advantages about barley as a crop—it can be profitably produced on a lighter soil than would suit wheat, the yield is usually much greater per acre, and the price for good grain higher than for wheat.

We have of late so frequently written at length on the proper methods of growing, harvesting, stacking, and threshing barley that there is no occasion to repeat ourselves. Readers of the *Journal* should carefully study Mr. Redwood's paper on the subject, read at the Agricultural Conference at Toowoomba in June, 1902.

In 1901, there were 70,000 bushels of malt made in the State, of which 69,000 bushels were the produce of barley grown here; in 1902, the corresponding figures were 85,000 bushels and 75,500 bushels respectively. Thus, in the latter year, Queensland supplied 89 per cent. of her own demand of grain for malting. The malt home made, however, by no means represents

the requirements of the State for that article. The relation of Queensland malt made last year to the total demand is shown in the following statement:—

Malted in Queensland, 1902	...	...	...	85,000 bushels
Imported, less exported, 1902	...	...	...	117,134 „
Total	...	...	...	202,134 „

So that Queensland malt only met 42 per cent., and Queensland malt made from Queensland barley 37 per cent., of the State needs for that article. Whatever malting is carried on during 1903 must be upon grain almost entirely imported, so that the foregoing ratios are the best to which we have yet attained.

Seeing that Queensland malting is carried on in the centre of the barley districts, and that the imported grain has to be freighted by train 100 miles for treatment, it presents a strange anomaly to the uninitiated that, taking 1 bushel of malt to represent 1 bushel of barley, of the 193,538 bushels harvested in 1901 only 75,500 were malted, whilst a further supply of 9,500 bushels were required and imported even to meet the demand for malting, without considering the 117,134 bushels represented by the imported malt. The crop for 1903 appears from all accounts likely to greatly exceed that for 1901, whilst the demand for malt could only absorb about 200,000 bushels.

In any case, an outside market will have to be looked for, but unless the maltsters and farmers can better agree in the future than in the past as to quality and price, an increased proportion of this crop will have to be sent elsewhere or utilised for other purposes, whilst the practice of importing barley and malt in large quantities is likely to continue.

The relation between home produced and imported malt for a series of years is shown in the following table:—

	Malted in Queensland. Bushels.		Malt Imported. Bushels.
1893-94 (financial)	... 1,408	1893	... 121,607
1894-95 ditto	... 4,537	1894	... 127,188
1895-96 ditto	... 12,988	1895	... 153,843
1896-97 ditto	... 14,400	1896	... 147,474
1897-98 ditto	... 34,589	1897	... 156,613
1898 (calendar)	... 32,629	1898	... 129,811
1899 ditto	... 62,271	1899	... 127,469
1900 ditto	... 72,730	1900	... 134,098
1901 ditto	... 70,000	1901	... 121,424
1902 ditto	... 85,000	1902	... 45507 centals=119,755

The increased demand for malt has been more than met by the Queensland production, this also having trenched to some extent on the imported article. The quantity produced in the State in 1902 exceeded the output of the next best year by 12,270 bushels, whilst the quantity imported was less than in any year since 1892.

The quantity of beer brewed and malt used in Queensland during each of the last five years was:—

	Beer.		Malt.
1898	... 5,028,007 gallons	...	185,310 bushels
1899	... 5,422,194 „	...	181,092 „
1900	... 5,738,190 „	...	192,668 „
1901	... 5,325,314 „	...	188,100 „
1902	... *5,333,202 „	...	170,610 „

* Including waste 260,038 gallons.

LINSEED GROWING.

Last month it was stated that, owing to the rebellion in Macedonia, there would be a dearth of linseed in the market. That country exported annually 200,000 bags of linseed, and last year none was sown. As a consequence, the deficit must be supplied from other sources. The area under flax in Europe is about 3,500,000 acres. Russia alone cultivates nearly 2,000,000 acres; Germany, 500,000; Austria, 250,000; France, 194,000; Italy, 200,000; Ireland, 120,000 acres. In Egypt and India the plant is principally grown for seed, as in Macedonia, but in the other countries for fibre.

In November, last year, linseed was quoted at from 36s. to 46s. per 416 lb. The average yield per acre in Australia is set down at 12 bushels of seed, saleable at 4s. 6d. per bushel, and 6 cwt. of fibre, at £2 per cwt., besides 1 cwt. of tow, worth 10s. The total cost of production per acre amounts to £9 12s., and the gross return may be stated at £15 4s., leaving a net profit of £5 12s. per acre. We have on several occasions described the methods of flax-growing, mainly the experience of Messrs. Woolfe Bros., of Traralgon, Victoria, who have large areas under flax, aggregating, we are informed, over 700 acres. We find the following article on the subject in a late number of the *Pastoralists' Review*, taken from a pamphlet on flax-growing by Mr. C. J. McCallum:—

The right month to sow the crop is May. It will grow in almost any land. The better the land, however, the better the crop may be expected to be. The land should be quite clean of weeds, and should be thoroughly pulverised by ploughing, then harrowing once or twice, as the case may require, and then a rolling. The seed may then be drilled with a broad-cast drill or hand sown. Great care must be taken to have the ground evenly sown, as a crop with some stalks thick and others thin, a result of uneven sowing, cannot be properly treated with the breaking machine. The time to harvest is when the seed bolls on the top of the plants are turning brown. When tied in small sheaves by the reaper and binder or by the hand-pulling system—whichever is adopted—it is left a short time in the field to dry, and then stacked. It may be left in the stack until the autumn rains are expected, when it is threshed by passing the heads of the sheaves between rollers, on something like the principle of a mangle. The seed bolls are crushed by this, and the seeds fall out. In all operations great care should be taken to keep all the straws as even as possible. The sheaves are then untied, and the straw laid out in rows (say, about 2 or 2½ inches thickness of straw) in a grassy plot. There it is left for the rain and dew to do their work of destroying part of the plant. This should be completed in about four or five weeks, the whole of the straw being once turned, say, when it has been down a fortnight. The flax is sufficiently "retted" when, on breaking any of the straws, the fibre separates freely from the woody portion inside. It should then be stooked—if possible in unbound stooks—to allow it to thoroughly dry before again stacking or carting straight to the breaker. Breaking or scutching—the operation now necessary to turn out the marketable fibre—may be done at any time, but care must be taken not to allow the retted flax to again get wet, whether in the stack or elsewhere.

COST OF PRODUCTION PER ACRE.

1½ bushels seed, at 4s. 6d.	£0 6 9
Ploughing, harrowing, sowing	0 13 3
Weeding, 3s.; pulling, 25s.; carting and stacking, 4s.; threshing, 15s.; spreading for retting, 15s.; turning, 2s.; gathering and stacking, 12s.	3 16 0
Breaking and scutching, at 12s. per stone of fibre (6 cwt. fibre per acre)	4 16 0
	<hr/>
	£9 12 0

GROSS RETURN.

6 cwt. fibre, at £2 ...	...	...	...	...	...	...	£12	0	0
1 cwt. tow, at 10s. ...	...	...	...	...	...	...	0	10	0
12 bushels seed, at 4s. 6d. ...	...	...	...	...	...	...	2	14	0
							<hr/>		
							£15	4	0

The rent of land and freight to market on the produce is not here taken into account. A net return is shown of £5 12s. per acre, and as this estimate provides for harvesting the crop by pulling, a still better result would be shown with the new system of cutting with reaper and binder.

SHEEP AND GOATS ON THE FARM.

The advantage of keeping a few sheep on the farm has been demonstrated in the case of last year's wheat crops. The wet weather which prevailed for some time after the wheat was well above ground caused much of it on the rich land to gather and lodge. Those who had sheep turned them into the wheat fields to eat down the superabundant growth. In some cases the sheep were put in two or three times, with the result that a good crop was obtained, whilst on other farms, where no sheep were available, the yield was not so satisfactory. But apart from this use for sheep, it can be shown that they are a positive benefit in other ways. For instance, they glean a great deal of stuff which would otherwise be wasted. Their droppings enrich the land. They will consume a quantity of straw and stubble which is generally sacrificed to the firestick. They keep the farm clean, so that few weeds have the chance of coming to maturity and seeding. Again, they save the farmer a good deal of expense in the production of meat, because it can be produced on the farm at far less cost than it can be bought for, added to which are the wool and the skin. Then, again, the lambs, when fattened for market, generally realise good prices (the latest prices at Brisbane saleyards ran to 16s. 9d.), and as a little flock can be kept almost entirely on fodder which would go to waste, the returns are pure profit.

Some people advocate the purchase of aged merino ewes. Full-mouthed ewes will give better lambs than young ones, provided they are not broken-mouthed. Others maintain that, in a general way, it is not good business to buy old sheep, for three young sheep can be kept where only two old ones could be kept. The latter require nursing very often, whereas the young ones can be treated in an offhand way, and these can pick up a good living and clean the farm better than the old ones. When buying sheep, the ram should be a long-woolled animal—a Lincoln. Crossbred rams should be avoided. The ram should be well-grown, squarely-built, deep-set, straight and broad in the back, wide in the chest, with stout, well-set legs, and should not be full-mouthed.

One thing must be guarded against, and that is over-stocking. Where sheep are regularly fed, many more, of course, can be kept than if they have to depend entirely on natural grasses, stubble, fallow fields, &c. Every farmer who has 500 to 1,000 acres can keep from 100 to 200 sheep. In South Australia, most farmers keep sheep. Here is what one of them says about sheep on the farm:—

Sheep on farms are a necessity. Sheep serve the purpose of an agricultural implement, cleaning the land which otherwise cannot be kept clean, as it will not stand the continual working which would be necessary. Every farmer who has 500 to 1,000 acres of land can keep a few sheep, say from 100 to 200, with great advantage to his land, besides the ready money they bring him in each year. The farm must be divided by sheep-proof fences into small paddocks, so that all the feed can be utilised, and thus keep the paddocks intended to be fallowed well fed down, so that no weeds or grass are allowed to seed. After fallowing is done, run the harrow over it; let the sheep do the

rest until seed time. The pure merino is the most suitable, as they do well with less feed than any other kind, and do not trouble the fences. Always keep a young flock, saving a few of the best ewe lambs each year, and then either dispose of the same number of full-mouthed ewes, or, if there is fair feed after the remainder of the lambs are sent to market, keep the rams from them and they will soon pick up and make good meat for use on the farm through the winter. In selecting the ewe lambs to keep, choose those with a dense and fairly coarse fleece, as the extra weight pays better than a better quality fleece, and does not get so dirty. In drafting lambs some farmers put back a poor lamb into their flock, saying it is not good enough for market; but this is a great mistake, as, if it has had the same chances as the others, it must have a poor constitution, and should be the first to go, for if it is not good enough for market it certainly is not a profitable sheep to keep. A farmer, to use his sheep to the best advantage for his land, cannot expect to have fat sheep; therefore he thinks ewes and land are the most profitable to keep. A ewe lamb during four years will bring in about £2 7s. 10d. in cash, and leave a good 2-tooth ewe to take her place. A lamb dropped in April will cut about 4 lb. of wool at 5d. per lb., 1s. 8d.; at 2-tooth, 9 lb. at 6d. per lb., 4s. 6d.; at 4-tooth a lamb is worth 7s. 6d. and cuts 9 lb. of wool at 6d. per lb., 4s. 6d.; at 6-tooth a lamb has to be kept and cuts 9 lb. wool at 6d. per lb., 4s. 6d. The lamb kept cuts 4 lb. of wool at 5d. per lb., 1s. 8d.; at 8-tooth a lamb is worth 7s. 6d.; cuts wool worth 4s. 6d. The hogget kept cuts 9 lb. at 6d. per lb., 4s. 6d.; then sell the old ewe for 7s.—making the total income £2 7s. 10d. By keeping ewes and lambs the flock is largest when feed and water are plentiful. Then send the lambs to market; sell some of the full-mouthed ewes, so there are fewer to be kept when feed and water are scarce. By working on this principle you always have a young flock. Old sheep do not do as well as young sheep on little feed. The same grass that keeps an old sheep only worth 5s. will just as well keep a young one worth 10s. or 12s.

THE LAMBS.

With reasonable treatment there should be an increase of 85 per cent. of lambs. These, if not required for home use, should be fattened, and will realise good prices. No matter how cheap sheep may be, prime lambs always pay well. Even at the low prices ruling for wool, each ewe and lamb should return 2s. The lambs should not be bred from, or all types of sheep will result, and none of them as good as the parents.

GOATS.

We have written voluminously on the value of goats on a farm, particularly with reference to Angora goats. They are excellent scavengers and scrub clearers. They are more profitable than sheep in rough country, and are less troublesome than the former. They need not be shepherded, as they are very regular in returning to the yards. They can stand drought, heat, and cold better than sheep. Their flesh is superior to mutton. A good Angora will shear 6 lb. of mohair annually, worth from 1s. to 1s. 8d. per lb. Four or five Angoras can be kept on an acre of rough country well covered with scrub, herbs, small undergrowth, &c. They pay to fatten up to 15 years of age.

From this short description of the value of the Angora on the farm, it will be observed that they can be kept on any rough, densely scrubby country where sheep could not be kept. They get rolling fat on such fodder as sheep would not touch. There is another great advantage in keeping Angoras as well as sheep—the goats will clear off the undergrowth to such an extent that sheep may then be grazed over the same land. Next month we intend to show, by illustrations, how perfectly the land is cleared by the goats in a very short time.

Dairying.

DAIRYING AT DUGANDAN.

Most encouraging reports are being received of the rapid revival of the dairying industry in all the districts where that branch of rural business is carried on. The dairy farmers, who suffered so severely from loss of stock during the drought, have been busy re-stocking with first-class dairy cattle. This fact, combined with the magnificent season and the superabundance of grass and fodder crops, has resulted in splendid returns of milk and cream, of which large supplies are daily being received at the creameries and butter factories.

Amongst many thus favoured districts, we may instance Dugandan, in the Southern district, where dairying is largely carried on. Here Mr. J. Harcastle has an up-to-date dairy, and a herd of first-class young milkers, which have taken the place, to a large extent, of the older cattle, 50 per cent. of which perished during the drought in 1902. Two years ago Mr. Harcastle was milking 45 head, which in October, 1901, yielded 1 ton of cream.

Reading from left to right, the cows depicted in the illustration are: Gem (Illawarra); Jamberoo, champion shorthorn dairy bull; Diamond Jubilee, shorthorn; Whitelegs, shorthorn; Duchess, Illawarra; Fancy, shorthorn; and Cicely, shorthorn.

Four years ago sixteen heifers and a bull were obtained by Mr. Harcastle from the herd of Mr. C. W. Craig, Jerrara Park, Kiama, New South Wales; six of these heifers died during the drought. The three mentioned in the following return give promise of becoming great milkers in another couple of years. The record of Diamond Jubilee is an exceptional one, and for the first week in November, 1903, she averaged 66 $\frac{3}{4}$ lb. of milk per day, giving on the 5th of the month 72 $\frac{1}{2}$ lb. and on the 6th 71 lb. This cow was bred by Mr. Harcastle's father, and is descended from a cow named Polly, which he bought from Mr. Robert Gray, son of the late Rev. W. Gray, of Oxley, in the old coaching days. She is a remarkable animal, having had her previous calf in May, 1902. For three months her only food consisted of dry, stunted cornstalks, and notwithstanding this she kept the household, as well as two neighbours, supplied with milk and butter.

The remnant of the old milking herd was brought back to Dugandan in August, 1902, and they were then fed on chaffed sugar-cane, &c., and this cow then milked well right up to September, 1903. On the 10th she dropped a calf. Three days afterwards she was giving over 4 gallons of milk daily, and has been steadily rising ever since. A careful record is being kept, the results of which we hope to receive in time to publish in this issue. During October, only 24 cows were being milked, one-third of them heifers with their first calf. The average of cream per cow amounts to £1 per head.

MILK and BUTTER RECORDS for SIX COWS for MONTH of OCTOBER, 1903.

Name.	Age.	Lb. of Milk.	Test.	Lb. of Butter.
	Years.			
1. Gem	5	1,333	3.3	48.3
2. Diamond Jubilee	8 $\frac{1}{2}$	1,759	3.8	74.0
3. Whitelegs	10	1,135	4.0	50.4
4. Duchess	5	1,145	3.7	47.0
5. Fancy (near fence)	8	1,128	3.3	40.8
6. Cicely	5	1,384	3.3	51.8
		7,884		312.3
Average per cow ... ..	...	13.14	...	52.0



DAIRY CATTLE AT DUGANDAN.

The names are placed in the order in which they appear in the photo., reading from left to right (the bull is between Gem and Diamond Jubilee). They were fed on natural pasture only. Fancy calved in August, and has been milking a month longer than the others. Her record for September was 1,232 lb. milk and 44.63 lb. of butter. The weights and tests have been carefully taken, and Mr. Hardcastle says they can be relied upon as correct.

HOW MUCH FOOD IS NEEDED FOR A COW, AND HOW CAN WE REDUCE THE QUANTITY NEEDED?

By F. WITTING, Graduate, Alnarp Agricultural College, Sweden.

How much food is needed for a cow to keep alive depends upon her live weight, the amount of water in the food, and the general treatment of the cow. During the early stage of the late drought, the cattle were kept on poor pastures. The result was that the digestive system of the animals was greatly disturbed by the strengthless food, and when we commenced feeding it seemed very nearly impossible to satisfy them.

All foodstuffs contain more or less water, even the foodstuffs which appear perfectly dry. If the percentage of water found by analysis is deducted from the weight of foodstuff, the remainder is called "dry matter" or "dry substance." The heavier the animal is, the more "dry substance" is required to keep the animal alive: 200 lb. of good hay, straw, or grain, and dry foodstuffs generally contain 170 lb. of dry substance; 200 lb. of turnips, on the other hand, contain only 16 lb. and potatoes about 50 lb. of dry substance.

For every 200 lb. the animal weighs, it requires in the daily allowance, if it is in high milkflow, about 6.4 lb. dry substance; if in medium milking stage, about 5 lb.; and if dry, about 4 lb. However, experiments have proved that the need of dry substance for a working bullock has been reduced to 3 lb. per 200 lb. live weight per day. Professor Julius Kühn, of Halle, Germany—one of the best authorities on this subject—has proved that the amount of dry substance, even for milch cows, can be, by degrees, brought down to 3.6 lb.; but in this case straw food must form at least the half of the weight of the whole daily allowance.

A milking cow requires—

At 200 lb. live weight, 12.4 to 10.0 lb. dry substance per day.

500 " " 16.0 to 12.50 " " "

600 " " 19.2 to 15.0 " " "

A dry cow requires—

At 400 lb. live weight, 8.0 to 7.2 lb. dry substance per day.

500 " " 10.0 to 9.0 " " "

600 " " 12.0 to 10.8 " " "

It is known that very small cattle, in proportion to their weight, require slightly more food than do larger ones. It is, therefore, of importance that only cautiously and by degrees can we arrive at such small quantities of dry substance as the above mentioned. For guidance we will here state that 6, 8, 10, 12, 14, 16, 19 lb. dry substance are supplied from 7, 9.4, 12, 14, 16.4, 21 lb. of hay, straw, crushed grain, and other dry foodstuffs, in which the water percentage is about 15 per cent.

Whether these quantities of food are able to produce milk or keep up the condition depends upon how they are mixed, and not on their quantity. In the case of straw food, it depends upon the quantity of hay it contains, and in the case of "strength foods" or "concentrated foods" (grains and oil-cakes) on the amount of albumen they contain.

As a rule, 5 to 6 lb. of hay, 12 to 16 lb. of straw, or 20 to 24 lb. of roots (turnips, potatoes, &c.) are, as far as the nutritive qualities are concerned, considered equivalent to 2 lb. of "strength food," consisting of 1 lb. of oil-cake and 1 lb. of crushed grain and bran.

A pregnant cow, which yields a few pounds of milk per day, requires, for every 200 lb. of her live weight, a food which, in its nourishing strength, is equal to from 2.2 to 2.6 lb. of the abovementioned mixture. In order to make such a food as bulky and satisfying as possible, we would recommend to give the "strength food" in the form of bran, which "fills up" very nearly twice as much as oil-cake and more than crushed grain.

For a low-milking pregnant cow of 600 lb. live weight, the daily allowance should be—

About 5 lb. hay=1 strength food unit.

14 lb. straw=3 strength food units.

And 2.6 lb. strength food=2.6 strength food units.

a total of 6.6 strength food units, and with a content of 18.2 dry substance.

In order to cut down the requirement of straw food as much as possible, we should give the food dry. All "soups," such as bran-mashes, &c., the main content of which is water, should be avoided. A great quantity of water expands the bowels, and the animals require more food to feel satisfied. The nourishment which is in these soups serves the purpose just as well without water. Too much water lowers the temperature of the body, and acts on the capacity of the digestive system to extract the nourishment from the food. We must, instead, assist the work of the digestive system by every means.

The drought is only a ghastly tale now, and what it taught us will soon be forgotten. We are enjoying a good season, and, food being plentiful, very few farmers indulge in hand-feeding their cattle. The above advice may, therefore, seem uncalled for; but, who knows? We may be unfortunate enough to have to face another drought, which Heaven forbid, and then this will come in handy.

EXPERIMENTS IN FATTENING OF PIGS.

By F. WITTING, Graduate, Alnarp Agricultural College, Sweden.

At the experimental farm at Lauchstadt, near Halle A/S., Germany, various experiments on feeding have been carried out under the supervision of Professor Schneidewind, in order to solve some practical questions relating to pig-raising.

Amongst other items, the important question, the amount of protein and non-nitrogenous substances required in the food, has been made a subject of careful investigation. As the results obtained by Professor S. during the course of these experiments are of a very interesting and practical nature, we will give a brief account of them.

One of the experiments had for its purpose to determine what influence higher or lower content of protein in the food has on the fattening. The experimental animals were subjected to the experimental feeding when they had arrived at a live weight of 50 kg. (110 lb.), and the experiment was continued until the live weight of 125 kg. (275 lb.) was gained. Three comparative groups of pigs were submitted to the experiment, the first with a high, the second with a medium, and the third with a low amount of protein in the food. The composition of the food was in other respects the same. In all the groups, the amount of protein was lessened correspondingly with the increase in the live weight, which, as we all know, is usual in the fattening of pigs.

The food for the different groups, therefore, contained the following amounts of digestible nutritive substances per day and per 1.000 kg. live weight—

DIGESTIBLE SUBSTANCES.

	Nitrogenous.	Non-nitrogenous, including Fat.	Nutritive Ratio.
	Kg.	Kg.	
GROUP I.—			
50-75 Kg. live weight	6.25	25.0	1 : 4
75-100 " " " " " " " "	5.00	25.0	1 : 5
100-125 " " " " " " " "	4.17	25.0	1 : 6
GROUP II.—			
50-75 Kg. live weight	4.17	25.0	1 : 6
75-100 " " " " " " " "	3.57	25.0	1 : 7
100-125 " " " " " " " "	3.13	25.0	1 : 8
GROUP III.—			
50-75 Kg. live weight	3.13	25.0	1 : 8
75-100 " " " " " " " "	2.78	25.0	1 : 9
100-125 " " " " " " " "	2.50	25.0	1 : 10

The result of the experiments was as follows :—

	Increase of Weight per Day of Animal.	Price of Production per 100 kg. Live Weight.
	Kg.	Mark.
GROUP I.—High amount of protein (nutritive ratio 1 : 4-6)	0.755	52.67
" II.—Medium " " " " " " " " 1 : 6-8)	0.790	47.13
" III.—Low " " " " " " " " 1 : 8-10)	0.710	48.74

From this will be found that per 1.000 kg. live weight, a food containing 3 to 4.5 kg. protein is quite satisfactory during the abovementioned periods of fattening. An increase in the amount of protein above this rate did not produce any increase in the weight. However, under no circumstances should the daily amount of protein fall below the above stated norm in any considerable degree, if we want to be sure of a normal production.

In many cases, especially if we give the pigs plenty of potatoes and grain (maize or barley), the mistake of giving but a poor supply of protein is very often made.

The amount of non-nitrogenous substances required in the food was also made an object for investigation by way of feeding experiments at Lauchstadt. In this case comparisons were made between the results obtained from two groups of pigs, the food contained per day and 1.000 kg. live weight—

DIGESTIBLE SUBSTANCES.

	Nitrogenous.	Non-nitrogenous, including Fat, × 2.50 Kg.
	Kg.	Kg.
GROUP I.—		
50-75 Kg. live weight	4.5	24.0
75-125 " " " " " " " "	3.5	24.0
GROUP II.—		
50-75 Kg. live weight	4.5	30.0
75-125 " " " " " " " "	3.5	28.0

The result of the experiment was—

							Increase in Weight per Day of Animal.	Price of Production per 100 Kg. Live Weight.
							Kg.	Mark.
GROUP I.	...	...	...	...	...	...	0.650	39.94
„ II.	...	...	...	...	...	...	0.734	44.01

1 kilo = 2.20 lb. avoird.; 1 mark = 1s.

Thus it will be seen that, although the increase in weight is greater in feeding with a liberal allowance of non-nitrogenous substances, at the same time this increase has not been so high that it has been able to pay for the increased expense.

On account of these and other experiments, the following ratios for feeding fattening pigs have been adopted at Lauchstadt (per day and per 1.000 kg. live weight)—

DIGESTIBLE SUBSTANCES.

							Nitrogenous.	Non-nitrogenous, including Fat.
							Kg.	Kg.
50-75 Kg. live weight	...	...	...	...	...	...	4.50	24.00
75-100 „ „ „	...	...	...	...	...	...	3.50	21.50
100-125 „ „ „	...	...	...	...	...	...	3.00	19.25

DENMARK'S EXPORT OF EGGS, BUTTER, BACON, AND MEAT DURING THE YEAR 1902.

Eggs	...	36,403,334 doz.; increase in 1902,	222,666 doz.
Butter	...	139,533,000 lb.; „ „	5,850,000 lb.
Bacon	...	141,564,000 lb.; „ „	22,195,000 lb.
Fresh Meat,			
Preserved Meat,			
Sausages, etc.	47,404,000 lb.; „ „		9,966,000 lb.

The total value of the aforesaid products, exported during the year 1902, was £13,729,445; and if the value of the exported fat stock, £557,777, is added thereto, we get a grand total of £14,287,222. The corresponding figures for the year 1901 being £13,018,333, the increase for 1902 is £1,268,889.

These are marvellous figures, if we consider that the nation consists of only 2,000,000 souls, of whom (according to statistics) not more than 800,000 make their living from agricultural pursuits.

AUTOMOBILE ON THE FARM.

The motor-drawn reaper and binder is likely (says the *Age* London correspondent) to become a familiar object on the smooth little wheat fields and meadows of England. This year's tentative experience with it has been entirely in its favour. The motors are found to be both faster and cheaper than horse traction. A typical case is mentioned, in which a motor-drawn reaper and binder cut 19 acres of wheat in 10 hours, at a cost of about 2s. per acre.

The Horse.

THE QUEENSLAND SADDLE HORSE, AND HOW TO BREED HIM.

The exportation of remounts from Queensland to South Africa, during the recent war, has, fortunately, and none too soon, called public attention to the very indifferent quality of the horses now bred in this State. Everyone interested in the subject was well aware that, during the last twenty years or more, our saddle horses had been gradually deteriorating, so that at the present time there are few specimens of the fine upstanding animal which were to be found some thirty years ago. The report of the Parliamentary Select Committee has, however, placed on record this undoubted fact, and now that our deficiency in this respect has thus been officially recognised, it is to be hoped that no long interval will be allowed to elapse before steps are taken not only to retrieve our position in the eyes of the world, but also obtain a market for a most remunerative industry, whose very existence has been jeopardised by our negligence or indifference. The causes of the deterioration in our horse stock are not difficult to discern. First and foremost is the change that has taken place in the conditions of the country districts. Closer settlement has been going on year after year, and instead of large tracts of unfenced country, continuous enclosures meet the eye on every side, and it is only the very outside stations where the greater parts of the runs are not subdivided into paddocks. The state of things so aptly described by Adam Lindsay Gordon in his beautiful poem, "The Sick Stockrider," has passed away, and the scene pictured by the following lines is now only a memory of the past:—

"'Twas merry in the glowing morn,' among the gleaming grass,
 'To wander as we've wandered many a mile,
And blow the cool tobacco cloud, and watch the white wreaths pass,
 Sitting loosely in the saddle all the while.
'Twas merry 'mid the blackwoods, when we spied the station roofs,
 To wheel the wild scrub cattle at the yard,
With a running fire of stockwhips, and a fiery run of hoofs—
 Oh! the hardest day was never then too hard!"

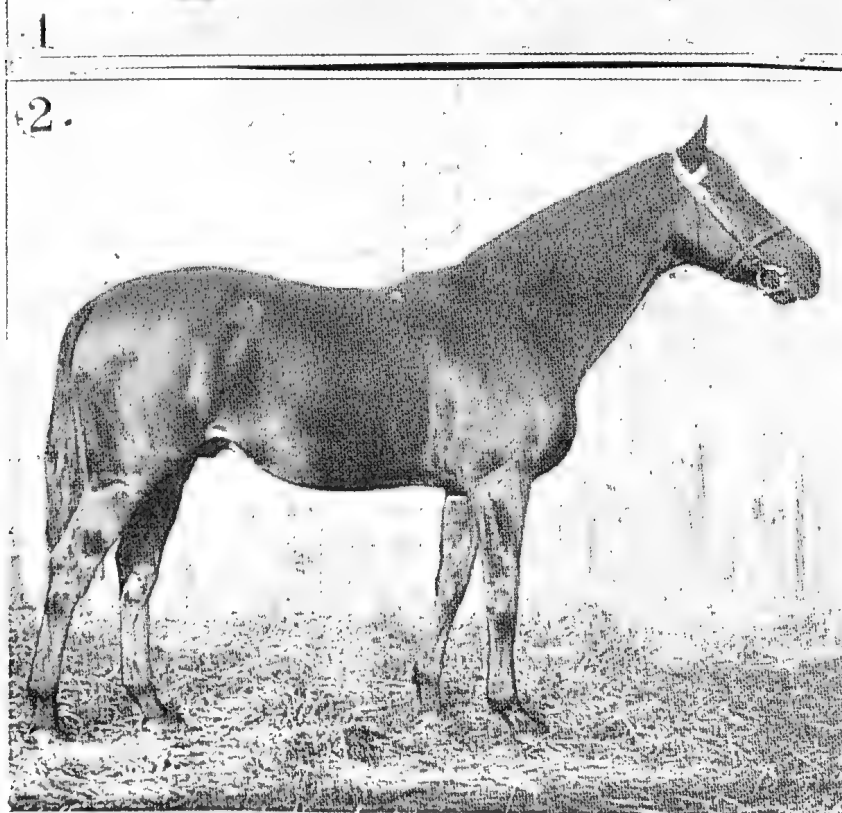
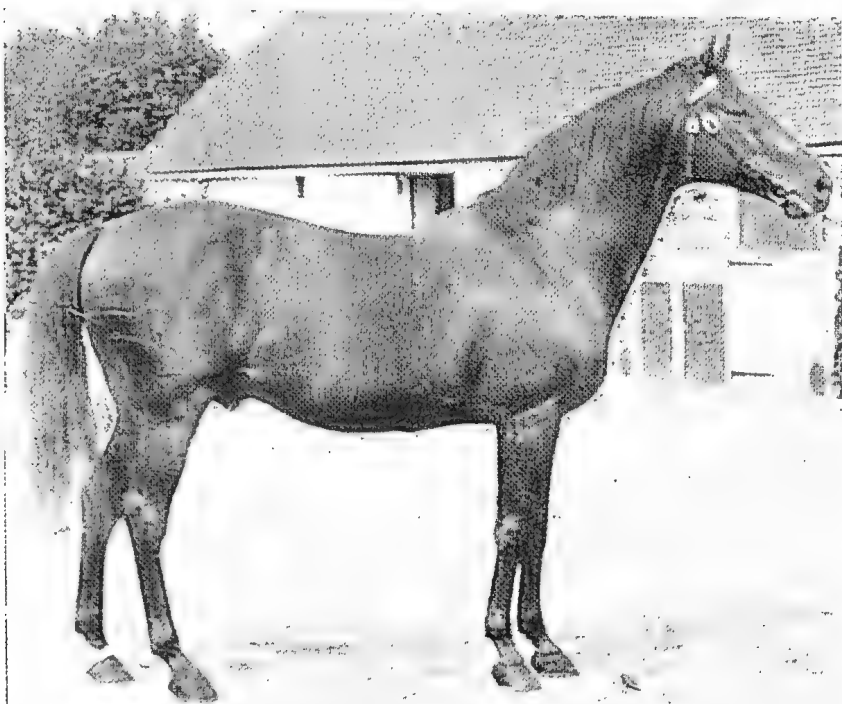
The work on the old-time cattle stations required horses of both speed and stamina, and as the owners of those days generally dearly loved a good horse, they took care to breed what was suited to their requirements, and the consequence was that thirty years ago there were to be found at all the large cattle stations saddle horses of a type that are now as extinct as the dodo.

Another great factor in the deterioration of our horses was the craze that set in some few years or so ago for trotters, coachers, and hackney stallions. There can be no doubt whatever that these stallions poisoned the breed, and helped to give us what are now so plentiful—a miserable type of animal, deficient in bone and stamina, low in the wither, straight in the shoulder, long in the back, and altogether deficient in all the attributes that are required in a perfect saddle horse. The importation of so-called Arab stallions, generally Persian or native Indian bred, has also had a good deal to do with this deterioration, for though a pure bred Arab, when crossed with the thoroughbred, is generally a great success, it is doubtful whether, since the days of Alif and Farhan, we have seen a pure bred desert-born in this State.

Again, promiscuous breeding, and the continued breeding from half or three-quarter bred sires, has worked incalculable mischief, for it is a well-known axiom in breeding that, in order to effect improvement, pure bred sires must invariably be used. Unlike the average horsebreeder, the Queensland sheep-

breeder, if using Lincoln rams with his merinos for the purpose of getting large mutton, would not dream of using the half-bred Lincoln-merino ram with his ewes. These are all turned into wethers, and go to the butcher, while the half-bred ewes are used to breed from, and mated with the pure bred Lincoln rams. By this means, the sheepbreeder secures an annual advance in the particular gradation he aims at. On the other hand, the general horsebreeder has gone the other way to work, and, by using half-bred and mongrel sires, has been diligently deteriorating the breed. *Facilis descensus Averni*—it is far easier to go down hill than take the upward path. And thus from sheer carelessness, indolence, and ignorance, our horsebreeders have now found themselves in the painful position of having their shortcomings held up to the ridicule of the world. We have to be thankful that the revelation publicly made as to our shortcomings in respect to South African remounts has brought us up with a round turn, and nobody will now be able to plead ignorance or extenuate the fact that prompt and vigorous action is necessary to rectify past mistakes and establish a valuable industry, which, as Lord Lonsdale informed the Select Committee, is awaiting us so soon as Queensland breeders comply with required conditions.

Now, to comply with these conditions, and effect the required improvement in our horse stock, both legislative and administrative action are necessary. The report of the Select Committee, under the presidency of the Hon. J. T. Bell, deals very fairly and forcibly with the legislative relief required. There are, no doubt, details which, when carefully examined, may or may not be deemed open to improvement. The powers proposed to be given to the Stallion Boards is one, and the abolition of early two-year-old racing is another. This latter point is, I consider, one of the greatest importance, for the early training and racing of our two-year-olds are the principal causes of unsoundness and subsequent weakness in the very class from which we have perforce to derive our stallions to improve our present stock. The turf clubs throughout Queensland are unable to effect a reform in this direction, and probably would not if they could, for, as racing has ceased to be a sport and has become a business, it pays to race early and often, and this is the sole consideration of the ordinary present day turfite. The Queensland Turf Club, even if disposed to discourage two-year-old racing before 1st January, could not bind the Central District and Northern District Associations, and none of them could bind the unregistered clubs, so that nothing short of legislation can be effective. The taxation of stallions would, doubtless, largely tend to make breeders exercise some discretion, while the bonus system, applied to approved stallions, would do more than anything else to encourage the use of a class of thoroughbred stallion which will produce the effect desired. Registration and inspection are two of the administrative remedial measures which appear decidedly essential, for, until this is done, we shall be literally working in the dark, as the available material is at present quite an unknown quantity. Now, as to the qualifications of the necessary sire: In the first place, a clean pedigree—that is a *sine qua non*. Then, as to conformation. He should possess good sloping shoulders, not overloaded, but with plenty of liberty when he moves. No less essential is propelling power behind. He must have a powerful back and loins, with strong quarters, muscular second thighs, with plenty of length from the hip to the hock. A great point is plenty of depth through the heart. The majority of stayers will be found to have good back ribs. Good flat feet are very requisite. If the pasterns are well set on at the proper oblique angle with the fetlock joint and foot, it matters little whether they are rather long or rather short. If the former, they may be easier and more springy, but, probably, also more liable to be weak. For choice, they are perhaps best when they have a tendency to be short. A ewe-neck is bad, and it is important that a stout, well-shaped neck should be firmly set on to the shoulders. A compact horse, not long in the back, is likely to prove the best sire, while another requirement is a long, lean head, with a good, bold, intelligent eye, and plenty of width between them. Now, if we can

Plate II.

1. MELTON, by Master Kildare—Violet Melrose (at Westerham).
2. ST. FRUSQUIN, by St. Simon—Isabel (at Southcourt Stud, Leighton Buzzard).



3. CARBINE, by Musket—Mersey (at Welbeck).
The property of the Duke of Portland.
4. PERSIMMON, by St. Simon—Perdita II. (at Sandringham).
The property of His Majesty King Edward VII.

find a sufficient number of thoroughbred sires possessing these qualifications, or the majority of them, it should not be a difficult task to breed the required stamp of saddle horse. If once the work was well begun, there would be every prospect of correcting deficiencies and defects as time went on, and in our case, the great thing is to make a commencement as soon as possible. We know well that breeding is very much of a lottery, but, all the same, there is the natural law that like begets like, and what has been accomplished through the exercise of judgment and careful selection by the cattle and sheep men will, without doubt, be the reward of similar efforts on the part of the Queensland horsebreeder. The present English thoroughbred is an instance of what has been accomplished in the old country. On another page will be found illustrations of Persimmon, St. Frusquin, and Melton, three of the leading English sires, and also of the Australian Carbine, now in the stud of the Duke of Portland. Persimmon shows all the attributes necessary in a successful sire of racehorses, while Melton appears to possess, in a great degree, the qualifications such as we have previously described, and which show us the stamp of thoroughbred sire required here. But though the use of such sires would be more than half the battle, the dams will also demand great consideration. At first, we shall have to work on the best we have got, but it is essential that only approved mares—that is, sound and free from obvious defects—should be used with the subsidised stallions. Then, again, the use of Suffolk Punch stallions to put to our light mares will probably prove the easiest method of obtaining a suitable supply of stud matrons, but on no account should the male progeny of such unions be kept entire. The continued use of subsidised thoroughbred stallions of the proper type would result in Queensland, in a few years, rivalling New Zealand in the production of useful and saleable horse stock. The State would thus establish a most remunerative industry, and the work inaugurated by the Hon. J. T. Bell and the Select Committee would be brought to a fitting and satisfactory conclusion.

HOW TO TAN.

The following is a method which has been used in a large tannery for many years in tanning fur or wool skins for robes, mats, &c.:—If the skin is not fresh, soak it thoroughly in soft water (never use hard water in tanning), then beam or scrape off all meat or loose fibre. Then put the skin in a luke-warm bath made of water with enough oil of vitriol to make it as sharp as vinegar, with a little salt added. Leave the skin in this 24 to 30 hours, when the native grease should all be removed, and the glue in the skin loosened from the fibre of the skin, so as to give the tanning materials an opportunity to operate directly on the glue and fibre. Now wash the skin thoroughly, wool or fur, with strong soft-soap suds, removing all dirt or grease from wool or fur; then rinse in clean water. Now dissolve, in hot water, 2 oz. alum, 1 oz. Glauber salts, 1 oz. borax, saltpetre the size of the end of your thumb, and add a little salt. Add this mixture to sufficient water, that is a little below blood heat, to cover the skin. Leave skin in this 24 hours; stir it up occasionally, so the liquor will reach all portions of the skin. Now strip out all the liquor that can be with the hands, and hang up in the shade to dry, for the sun will make it hard. When bone dry, sprinkle the flesh side with water, fold up until the leather is evenly damp, not wet; then stretch to length, then to width, then pull it back to its natural shape. If the skin is handled according to directions, the leather will be as soft and pliable as velvet. Success in making leather depends more on the manner of handling than on the materials used. To tan a skin without first removing all native grease and oil means that the leather will soon become rotten.—*Australian Agriculturist.*

The Orchard.

WORKING OVER MANGO-TREES.

By ALBERT H. BENSON, M.R.A.C.

The question of improving the general quality of our mangoes is one of the first importance to the growers of this fruit, as, until they realise that a very large proportion of the fruit grown in this State is of very inferior quality, and that the trees producing same require to be worked over with the best sorts, it is useless to attempt to make a market for this fruit in the southern States. The inferior fruit at present being sent south does not meet with a ready sale, which is not to be wondered at, as on arrival it is usually leathery and of an objectionable flavour, besides being more or less stringy. I am of opinion, however, that really good mangoes put on the southern markets in good order will take, and that a satisfactory trade can be worked up with them. At present the inferior stuff we have been sending has created a positive dislike for this really fine fruit, buyers seldom caring to repeat their experience once they have purchased same; and not only that, but condemning all mangoes, even though they don't know the taste of really good fruit.

The question of educating southern buyers will not be a difficult one, provided they get high-class fruit, as in my experience I have met with very few people who do not appreciate a really good mango, even when they are prejudiced against it through having had nothing but inferior fruit previously.

We have many good mangoes in this State, and there is no reason why we should not greatly increase their output, as it is as easy to grow good as inferior fruit. Working our inferior varieties of fruit trees is common with all kinds of deciduous fruits, such as apples, pears, plums, peaches, cherries, apricots, &c., as well as all kinds of citrus fruit, so that mango-growers will only be coming into line with the growers of other fruits. Unfortunately, the mango-tree has been looked upon as impossible to work over, and consequently there has been practically no attempt made to do so generally. Now, however, thanks to Mr. Horace Knight, of Rockhampton, this difficulty has been overcome, and the mango is found to be as easily converted from an inferior to a good kind as any other variety of fruit.

Mr. Knight informed the writer that he considered the mango as easy to bud as a peach, and that it took as readily (every fruitgrower knows how easy it is to bud a peach-tree), and, from what I saw of Mr. Knight's work when in Rockhampton last autumn, I am inclined to believe him. I inspected a large number of mango-trees worked by Mr. Knight, and saw very few misses, even when a large number of buds had been inserted in the one tree; and, further, I satisfied myself that a perfect union between stock and scion had taken place.

In the *Queensland Agricultural Journal* for July and August, 1900, there is an article by Mr. Knight on mango-grafting, with illustrations, which I strongly recommend all who keep their *Journals* to look up and study carefully, as it gives full particulars of the manner in which the work is carried out. As some of my readers may, however, not have the *Journals* in question, I will give a few extracts from Mr. Knight's article, as the best time for working the trees over is now on, and the present good growing season is an excellent one for carrying out the work.

The secret of success in Mr. Knight's method is, first, that the bark of the stock must work very freely; secondly, that the work is done when the tree is in full growth; and, finally, that the whole sap of the tree is forced into the bud at once, the top of the tree to be worked over being either cut

back or ringbarked as soon as the buds are inserted. "The conclusion I have arrived at is, that no other tree is simpler to graft. . . . The first three months of the year have proved to be preferable. . . . The grafts are simple pieces of bark, without any growth whatever on them. Of course, there must be dormant buds, or eyes, on them. . . . The most convenient size to use is a piece about twice the length of the breadth, and if it is taken off where rings exists, so that the ring is across the centre of the section, there will be two or three latent buds near the ring. The rings on the trunk and limbs denote the exact number of growths and rests the trees has made. At the point of every new growth, while resting, there is a whorl of leaves, and at the base of every leaf there is a bud, which is capable of becoming a tree, and, whether it is used for grafting during its infancy or ten years afterwards, it will develop with proper treatment." Continuing, Mr. Knight thus describes the method of taking the bud, and of inserting it into the stock: "First cut out the section for transplanting, and should the edges be bruised or torn cut them away to sound bark. Now press the piece firmly on to the spot where it is intended to grow, and make a clean cut all round. Next take out the bark inside the mark, and put the prepared section in its place . . . make it a nice fit, not too tight. Now bind it on with candle-cotton, with just sufficient pressure to make it touch its new parent. Avoid, if possible, binding immediately over the buds. . . . There is no necessity for clay or grafting-wax to ensure a good union, but just the candle-cotton. Should the weather be hot and dry when the grafting is being done, the top may be left on the tree for shade, but it must be thoroughly ringbarked 6 or 8 inches above the graft. In two or three weeks' time cut the top off at the spot at which it was ringbarked, and, if the buds have started into growth, remove the binding. All young shoots except those on the grafts must be rubbed off as soon as they appear."

The method of removing the bark for grafting recommended by Mr. Knight is to make a cut through the bark at both ends with a saw, and then to cut out the piece with a sharp Firminier chisel, both ends of saw-cuts being cut across. If the bark runs freely, the piece will fly out, but if not it will be necessary to saw into the wood a bit and prize out the bark with wood attached. The wood must be carefully removed without injuring the bark. It does not matter so much about the graft being dry, as long as the stock runs freely. When the bark runs freely a sharp knife will do the work all right, but a chisel is best when the bark sticks.

There is no difficulty in working the trees over if the instructions given are carefully followed, as I have proved practically on several occasions, and if time permits me I hope to graft a number of trees this coming season.

In addition to the grafting or plate-budding recommended by Mr. Knight, there is another method of working over mango-trees, which is similar to that used in the case of peaches, citrus fruits, &c. At the end of winter the trees to be worked are cut hard back to the main branches; these are allowed to throw out two main shoots, all others being rubbed off. The following summer these shoots are budded with the ordinary T bud, the bud chosen being a fully developed bud from fully matured young growth. When the bud is inserted the top of the shoot is cut off, and the sap forced into the bud, which starts very quickly, and makes a good union. The young shoot is treated just the same as a young peach bud, and, when it has made a sufficiently strong growth to prevent it being blown off, the stock is cut off close to the bud, so that the wound may heal over. In working over old trees by means of plate-budding, it is advisable to carefully trim all cuts close to the buds, when they have started well, with a sharp knife, so as to promote a growth of new bark over the wound. Painting the cut with white lead, or covering it with grafting-wax, would also tend to prevent the limb from dying back, as well as stop boring insects from laying their eggs in it. If this is done, the wound, though of large size, will soon heal over, and the tree will

show little signs of being cut back. The young shoots on strong branches will make a very rapid growth, as all the sap of the tree will be forced into them, consequently it will be necessary to thin them out, and shorten back, if they make an excessive growth, otherwise they may become top heavy and break off.

In addition to our growing better mangoes for the southern markets, it will also be necessary to send the fruit in better order. The present careless method of packing is unsuitable; greater care in gathering, handling, and packing is necessary to prevent bruising. The best fruit should all be wrapped in absorbent paper, and tight cases should be used in the place of the common, narrow case, with slat sides. A little extra care in handling and packing will greatly improve the carrying qualities of the fruit, so that it will reach its destination in good order and perfect condition for eating, a state in which it seldom reaches the market now. I trust that these few remarks will induce some of our mango-growers to work over their inferior trees with the best varieties—viz., mangoes of medium size, fine flavour, free or nearly free from fibre, and of presentable appearance—as I am certain that a profitable market can be established for fruit of this class, whereas, as already stated, the half-ripe, bruised, stringy, bad-flavoured rubbish we have been sending south has failed to make a market, and, in my opinion, is not at all likely to do so.

FLYING FOXES.

The fruit season is now upon us, and so is the flying fox. Numerous schemes have been devised for the destruction of these persistent pests. But shooting, blowing-up their night camps with dynamite, trapping with poisoned fruit hoisted on to trees, have all proved unavailing.

Now, the *Australian Agriculturist* publishes some suggestions by Mr. H. Parsons, of Gosford, for the mitigation of the pest.

In the first place, he has tried and had good results from barbed wire, stretched from tree to tree, or from light poles amongst the trees, as the barbs readily catch the delicate membrane of the wing, and hold. The wire would, however, be more effective, he thinks, if it were lighter, and the barbs longer than on barbed fencing wire, and he is of opinion that if special wire were made for the purpose there would be a considerable demand; at any rate the fruitgrowers might try this method with the lightest wire obtainable.

Mr. Parsons proposes, however, another plan. To go into an orchard at night, when the foxes are at work all round, is useless, unless they can be located and shot, and if a constant light is maintained it serves to scare the bats away. His idea is a flash light, which could be turned on to a tree, and instantly extinguished after firing. Suppose a hand apparatus, with magnesium wire, or ribbon, and a reflector throwing the light forward, as far as possible to one point. Within the bowl of the reflector might burn a small spirit lamp flame, giving so little light that it would not alarm the foxes, but serving to ignite the magnesium when it was pressed forward. A pressure of the thumb would thus give a bright light on any object, dazzling the animal for the moment, and the pressure of the thumb being released the bright light would instantly vanish, nothing remaining but the small blue spirit flame. How does this commend itself to orchardists?

[Our own experience this season has been that numerous strips of white calico hung on the trees appear to have the effect of keeping off the foxes. Not far from some large Moreton Bay fig-trees, which are nightly frequented by flying foxes, we had a flat China tree laden with fruit. The foxes never touched them, and we have had the satisfaction of gathering in all the fruit, free also of fruit-fly maggots.—Ed. Q.A.J.]

MANGOES FOR LONDON.

Mr. E. Bonavia, a physician lately residing in India, bought some mangoes in London, said to have come from Madeira. They were hard, and rather fibrous. In India they would be considered third-rate, yet the London price was 1s. 3d. each! He goes on to say:—If those I bought could sell for 1s. 3d. each, the best Indian mangoes would be worth 2s. 6d. each! There is surely some way of ensuring their safe arrival in London in good condition. Why cannot some experiments be made by packing the more likely varieties in a box or two, and leaving them unopened for the length of time they would take to travel from Bombay to London? How long do natives keep them in straw to ripen them? A few experiments at a trifling cost would show whether their transport is feasible.

[The doctor's suggestion has been anticipated by the Queensland Department of Agriculture, whose fruit experts have for some time been engaged in making such experiments with pineapples. When success in this direction has been attained, doubtless the mango, which is produced to perfection all along the Queensland seaboard, will receive due attention.—Ed. *Q.A.J.*]

ORANGES FOR LONDON.

We do not think that, from present knowledge, there is ever likely to be the same demand in London for Australian oranges that there is and will be for Australian apples, but from investigations made we have long held the opinion that there is and will be a good, regular, and profitable market for a moderate quantity of first-class fruit, but that it is not likely that there will be a regular profitable demand for ordinary, low, or medium class oranges. In the last report of the South Australian Department of Agriculture, Mr. E. Burney Young (manager of the London Wine and Produce Depôt) refers to the matter, and emphasises the desirableness of exploiting the London market during the last four months of the year with the orange. Mr. Young remarks, "I have frequently drawn attention to the opportunity open to orange-growers for shipping this fruit to London. South Australian—and likewise Mildura—oranges can be landed here during a period when no other oranges are available. In this connection I recently sent to the Minister . . . a cutting from the *Times*. . . It seems to me a pity that something cannot be done to cultivate this market with oranges. . . Good fruit shipped in cool chambers would be sure to command good prices. . . It is one of those golden opportunities which might be turned to good account. I feel sure that growers would always find a good market for good ripe fruit from September to the middle of December, and even up to Christmas.—*Garden and Field*."

ROADSIDE GRASS.

In times of scarcity of grass in paddocks adjacent to the railway lines, it may be noticed that within the railway fences grass grows luxuriantly, there being no cattle or any other stock to eat it down. This grass is, of course, all wasted, being periodically burnt off by the lengthsmen. Why cannot this grass be utilised for starving stock, as has lately been done in a Southern State? There, thousands of tons of grass go to waste annually along the roadsides.

A farmer lately made a few movable hurdles, in which he placed sheep and pastured them along the road, the farm fence forming one side of the hurdle. The hurdles were moved forward daily, and the result was that the roadside was cleaned off wherever the sheep were hurdled, while quite an amount of mutton was secured at a trifling cost. It is worth practising by others.

Viticulture.

THE WORLD'S VINTAGE OF 1903.

It will doubtless be interesting to the vignerons of Queensland to read the following remarks on the probable vintage of 1903, by Messrs. W. and A. Gilbey, in a letter to the *London Times*:—

While no very confident opinion can as yet be hazarded concerning the quality of the wines of 1903, no uncertainty, unfortunately, exists this year as to the abnormally small quantity in all the vineyards of Europe. On the Continent, as in England, every extreme of weather has been experienced this season. Not only the exceptionally late frosts—that of 18th April was alone estimated to have reduced the value of the possible crop in France by something like £20,000,000 sterling—but hailstorms, excessive rains, and the resultant mildew, have played havoc with the vines in almost every district. Added to this, spasmodic heats during the early summer—notably in Italy—have made up a sum of misfortunes which it is confidently asserted will, in the wine-production of the four great vine-growing countries of Europe—France, Spain, Portugal, and Italy—result in a deficit of no less than 40,000,000 hectolitres, or, say, 880,000,000 gallons, as compared with the yield of an average year.

It may interest your readers to have before them the figures showing the total production of wine during the past three years:—

THE WORLD'S PRODUCTION OF WINE IN 1900, 1901, 1902.

	1900.	1901.	1902.
	Gallons.	Gallons.	Gallons.
Europe—			
France	1,482,000,000	1,275,197,308	877,443,226
Italy	583,000,000	937,200,000	748,000,000
Spain	517,000,000	433,400,000	365,200,000
Portugal	139,000,000	132,000,000	105,600,000
French Possessions—			
Algeria, Tunis, and Corsica	130,000,000	122,037,938	82,852,000
Maderia, Azores, and Canary Islands	7,000,000	6,600,000	3,256,000
Austria-Hungary	114,000,000	99,000,000	156,486,000
Germany	80,000,000	52,800,000	46,200,000
Other European Countries—			
Russia, Switzerland, Turkey, Cyprus, Greece and Islands, Bulgaria, Servia, Roumania, Persia	351,700,000	325,600,000	244,200,000
North and South America	206,000,000	184,800,000	114,290,000
British Possessions—			
Australia	5,500,000	5,720,000	6,100,000
Cape of Good Hope	3,500,000	3,500,000	3,500,000
Total for World	3,618,700,000	3,577,855,246	2,753,127,226
Production in—			
Europe	3,403,700,000	3,383,835,246	2,629,237,226
North and South America	206,000,000	184,800,000	114,290,000
British Colonies	9,000,000	9,220,000	9,600,000

Mr. Charles Heidsieck writes to say that the champagne vintage is now finished, and it has turned out very unsatisfactory. The must is wanting both in fruit and ripeness, which must make a thin wine, such a champagne being unfit for the English market, where nothing but the best vintages are appreciated.

Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order PAPAVERACEÆ.

PAPAVER, Linn.

P. hybridum, Linn. Rough Poppy of Europe. A sparingly branched annual, 1 to 1½ ft. high. Leaves 2 to 3-pinnatifid, the segments linear, awned, radical ones petiolate, cauline sessile, sparingly hispid. Flowers 1 to 2 in. diam., scarlet, with a black disk. Sepals hairy, obtuse. Filaments dilated upwards. Capsule subglobose, about ½-in. long, hispid. Stigmatic rays convex, 4 to 8, reaching or exceeding the edge of the disk.

Hab.: Texas Station, Texas, W. G. Chilcott, 16th October, 1903.

Order CRUCIFERÆ.

LEPIDIUM, Linn.

L. foliosum, Desv. (Journ. Bot. III., 164 and 180; DC. Prod. I., 206; Benth. Flora Austr. I., 86.) A low, straggling, glabrous herb, with hard divaricate branches, 1 to 2 ft. high. Leaves mostly oblong-cuneate ½ to 1 in. long, or short and obovate, usually with a few coarse teeth at the top, sometimes toothed from the base or pinnatifid with short entire or even toothed lobes, usually narrowed below the middle, but always with a broad half-stem-clasping base and sometimes auricled. Flowers very small. Petals on short slender claws, with a minute white ovate lamina. Fruiting raceme 2 to 3 in. long, often becoming lateral by the elongation of leafy shoots, with spreading pedicels of about 2 lines. Pods ovate or elliptical, flat, 2½ to 3 lines long, sometimes almost wingless, but usually the very narrow wings form 2 minute obtuse, terminal points, between which is the very short style. Seeds exuding a not very thick mucilaginous coat. *L. cuneifolium*, DC. Syst. Veg. II., 545; Hook. f. Fl. Tasm. I., 25; *L. impressum*, Bunge, in Pl. Preiss. I., 260.

Hab.: Gatton, J. F. Bailey.

Order LEGUMINOSÆ.

MEDICAGO, Linn.

M. orbicularis, All. (DC. Prodr. II., 174.) A procumbent, slender, subglabrous annual, stipules short, deeply laciniated. Leaflets ½ to ¾ in. long, obovate-cuneate, faintly inciso-dentate. Peduncles shorter than the leaves, 1 to 3-flowered. Calyx about 1½ lines long, teeth linear-setaceous, corolla yellow, much exserted. Pod spiral unarmed, about ¾ in. broad of from 3 to 5 flattened spirals distinctly transversely reticulate veined. Seeds pale-brown dotted.

Hab.: Mediterranean regions, here introduced by cultivation.

TRIFOLIUM, Linn.

T. glomeratum, Linn. Clustered Clover. A slender spreading annual, glabrous or nearly so. Stipules short with a subulate point. Leaflets broadly obovate. Flower-heads small, globular, closely sessile in the axils of the leaves or at the ends of the branches. Calyx teeth short, broad, pointed, and recurved, Corolla pink. Pod 1-seeded.

Hab.: Europe. Becoming naturalised as a weed in cultivation.

T. Bonanni, Presl. Stems creeping. Leaflets obovate, retuse. Calyx tomentose, lower teeth setaceous, straight, and conniving. Flower-heads roundish.

Hab.: Sicily. Introduced with other seeds and becoming naturalised.

T. agrarium, Linn. The European Hop-clover. A branching annual, nearly glabrous. Leaves shortly petiolate; leaflets obovate or obcordate, toothed and striate, the central one on a longer stalklet, stipules half adnate, ovate-lanceolate. Peduncles axillary long or short; heads densely flowered, ovoid. Flowers deflexed, turning brown. Vexillum broad and distinctly lined. Pod 1-seeded.

Hab.: European. Introduced with other seeds and becoming naturalised.

Order UMBELLIFERÆ.

BUPLEURUM, Linn.

B. aristatum, Benth. A slender annual, from 2 or 3 to over 18 in. high, not much branched. Leaves grass-like, 1 to 2 in. high. Umbels small, terminal of 2 to 6, short rays. Involucres of about 5 lanceolate, green bracts ending in a fine point; general one usually longer than the rays; the partial ones rather shorter, but still far exceeding the flowers. Flowers yellow.

Hab.: Norman Creek, *Jas. Keys*. Introduced. In its natural habitat, the Channel Islands, this plant is found on rocks. It is often met with in stony wastes of Southern Europe, but I don't remember having previously seen it recorded as naturalised in Australia.

Order RUBIACEÆ.

GARDENIA, Linn

G. merikin, Bail. (Ql. Fl., page 2005.) Add to description: Flowers solitary or in twos or threes, terminal or in the upper axils; common peduncle very short or wanting. Bracts sessile about 4 lines long, tapering from a broad base to thread-like points, hairy. Pedicel with calyx-tube about 4 lines, hairy, teeth 5, about 1 line, acute with broad hyaline ciliate margins. Corolla yellow, subulate in the bud, velvety outside; tube 6 lines long, dilated upwards, hairy inside; lobes 5, about 9 lines long, linear and scarcely exceeding 2 lines broad. Stamens 5, inserted above the centre of the tube; filaments short; anthers long, narrow, partly exserted. Style rather slender. Stigma rather large, clavate.

Hab.: Atherton, *Dr. W. E. Roth*, November, 1903.

Order COMPOSITÆ.

WEDELIA, Jacq.

W. hispida, H. B. and K. (Nov. Gen. et. sp. IV., p. 215 t. 375). A slightly-branched plant, about 2 ft. high, more or less strigose; the branches terminated by solitary long peduncled flower-heads. Leaves sessile, or nearly so, lanceolate or the lower rhomboid-lanceolate, acute or acuminate, and with acute or cuneate base, irregular more or less serrate, sometimes with a pair of coarser teeth or lobes. Involucral bracts 2-seriate, the outer ones looser and foliaceous, lanceolate from a broad base, as long as the oblong inner ones. Ray-florets 7 to 9, orange-yellow, about 5 lines long, floret-lobes puberulent. Achenes obovate, either narrowly or broadly winged, or sometimes winged only near the summit. *Zexmenia hispida*, A. Gray.

Hab.: Mexico. Naturalised about Norman Creek, *Jas. Keys*.

ANTHEMIS, Linn.

Flower-heads heterogamous radiate, ray-florets 1-seriate, ligulate conspicuous, white or yellow, female or neuter. Involucre hemispherical; bracts pluriseriate closely imbricate with scarious margins, outer successively shorter.



Receptacle paleaceous convex or conical. Anther-base entire. Style—branches truncate, penicillate. Achenes oblong, apex obtuse; pappus none or coroniform or unilateral. Herbs with alternate-toothed or pinnatisect leaves often with narrow segments and terminal pedunculate, often rather large flower-heads.

A. Cotula, *Linn.* (Sp. Plt. ed. I., p. 894; "Stink Mayweed." A somewhat leafy but inconspicuously hairy herb, usually decumbent, branched, ranging up to $2\frac{1}{2}$ ft. high or more. Leaves tripinnatisect, ovate, 1 to 3 in. long; segments narrowly linear, acute or with a terminal callus. Flower-heads $\frac{1}{4}$ to $\frac{1}{2}$ -in. diameter, exclusive of the rays, terminal, solitary, pedunculate; involucrel bracts oblong, hairy, with a green midrib and usually dark-brown and crisped margin. Ligules of the usually neuter ray-florets, white, $\frac{1}{4}$ to $\frac{1}{2}$ -in. long. Scales of the receptacle narrowly lanceolate, nearly equalling the florets, tips setaceous-brown. Achenes without pappus; rough, with glandular dots.

Hab.: European; becoming naturalised about Norman Creek, *Jas. Keys*, and Nundah, *Nicol Robinson*.

Order CAMPANULACEÆ.

LOBELIA, *Linn.*

L. gibbosa, var. *microsperma*, forma *alba*. This has a pure white flower strongly contrasting with the deep blue of the normal form.

Hab.: Wellington Point, *Colin Kefford*.

Order THYMELÆACEÆ.

TRIBE PHALERIÆ.

LEUCOSMIA, *Benth.*

Flowers hermaphrodite. Perianth-tube cylindrical, elongate; lobes 5, spreading. Throat-scales short, alternating with perianth-tubes. Stamens 10 in 2-series, filaments short or none. Hypogynous disk short, cupulate, truncate. Ovary 2-celled; style filiform, stigma capitate. Fruit drupaceous, exocarp thin, endocarp hard often thick, 2-celled or 1 by abortion. Seeds solitary in each cell, testa thin; no albumen. Cotyledons thick-fleshy. Trees or shrubs. Leaves opposite. Flowers few or numerous, in heads terminal or at the nodes or axils, sessile or shortly pedunculate. Bracts ovate or orbicular forming an involucre, very soon deciduous. A genus of few species, belonging to the South Pacific Islands. (*Benth. and Hook., Gen. Plant., III., 199.*)

L. Chermsideana, *Bail.* (In honour of Lady Chermside, a lover of botany.) An elegant creekside tree or tall shrub, 12 to 20 ft. high, bearing numerous fragrant flowers. Branchlets slender, opposite, bark dark glossy-brown, wrinkled in the dry specimen. Leaves opposite, 2 to 3 in. long, ovate-lanceolate, more or less elongated and minutely apiculate at the apex, tapering towards the base, but scarcely petiolate, thin coriaceous, dark-glossy green. Flower-heads axillary or terminal. Peduncles slender, 3 to 4 lines long, solitary or several in an axil. Involucrel bracts 2, ovate, scarious, about 4 lines long. Flowers sessile, silky-hairy, the hairs longer at the base, white or more or less purple-stained. Perianth-tube 5 lines long, slightly expanding upwards, hoary inside, lobes 5, ovate-oblong, about $1\frac{1}{2}$ lines long. Throat-scales very short. Stamens 10 in 2 series, the lower row with almost sessile anthers, the upper row with very short filaments and the anthers rather larger. Style filiform, flexuose, silky-hairy, particularly the lower half; stigma oblong. No fruit seen.

Hab.: Killarney. *Josh. Wedd.* So far as at present known this is the first recorded species of *Leucosmia* that has been met with in Australia. It seems to be closely allied to the Fijian species *L. pubiflora*, A. Gray, the *Drymispermum pubiflorum* of Seemann; but the descriptions published of this plant are insufficient without authentic specimens to decide whether the Australian species is a form of that species or a distinct species; so I prefer to keep it distinct, particularly as the fruit of ours is so far unknown. Plate No. IV.: Two branchlets—one showing the early stage, showing the involucre which enclose the flower-buds; another showing flowers. A separate flower laid open to show sexual organs; and a bract.

Order GRAMINEÆ.

PHLEUM.

P. tenue, *Schrad.* (Fl. Germ. I., 181.) A delicate glabrous annual grass. Stems slender erect. Leaves thin, about 2 to 3 in. long; ligula scarious prominent, spike cylindrical tapering upwards, about 3 in. long and 2 lines diameter, glumes glabrous, cymbiform with broad hyaline border, 3-ribbed, anthers pale yellow.

Hab.: A grass of Southern Europe; naturalised near Norman Creek, *Jas. Keys*.

POLYPOGON, Desf.

(From *poly*, many, and *pogon*, a beard.)

Spikelets 1-flowered, in a dense spikelike or slightly branching panicle, the pedicels articulate with a tuft of short hairs above the articulation; glumes 3, 2 outer empty ones with a terminal straight awn, the terminal flowering glume smaller, thinner, entire or notched, with an awn in the notch or on the back, either twisted at the base and bent back at or below the middle, or small and straight, or reduced to a minute point. Palea smaller. Styles short, distinct. Grain enclosed in the slightly stiffened glume and palea, free from them. Benth. Fl. Austr. VII., 546.

P. monspeliensis, *Desf.*, *Benth. l.c.* An annual, procumbent at the base or rarely erect, ascending to 1 or 2 ft., glabrous or nearly so. Leaves flat, the ligula rather large. Spike like panicle cylindrical or slightly branched, very dense, 1 to 3 in. long, often of a yellowish shining green. Spikelets very numerous, but almost concealed by the fine awns, the hairs surrounding the spikelet above the articulation few and very short. Outer glumes scarcely 1 line long, pubescent or ciliate, obtuse or notched, the fine straight awn 3 or 4 times as long as the glume. Flowering glume broad hyaline, truncate or jagged, the awn usually reduced to a short point or entirely wanting. Hook. f. Fl. Tasm. II., 117; Reichb. Ic. Fl. Germ. t., 31.

Hab.: This grass is common in most temperate and subtropical regions, but is in many localities probably, as in Queensland, an introduction. Of little agricultural value.

AIRA, Linn.

(Greek name of *Lolium temulentum*.)

Spikelets 2-flowered, small, in a loose or rarely contracted panicle, with capillary branches, the rhachis of the spikelet articulate and minutely hairy between the flowering glumes, and not at all or scarcely produced beyond them. Glumes thinly scarious, 2 outer empty ones nearly equal, acute; flowering glumes close above them, shorter, thin, and hyaline, finely pointed or shortly bifid, with a fine awn dorsally attached below the middle and twisted at the base. Palea 2-nerved. Styles short, distinct. Grain enclosed in and more or less adnate to the very thin glume and palea.

A small genus, generally distributed over the temperate regions of both the northern and southern hemispheres.

A. caryophyllæa, *Linn.* (Benth. Fl. Austr. VII., 585.) A slender elegant tufted annual, rarely above 6 in. high. Leaves short and fine. Panicle loose and spreading, the capillary branches in pairs or threes. Spikelets erect, silvery-shining. Outer glumes 1 to 1½ lines long, almost scarious, very acute. Flowering glumes shorter, the dorsal awn projecting about a line beyond the outer glume. Reichb. Ic. Fl. Germ. t., 94.

Hab.: North Africa and temperate Asia. During the present spring (1903) common on the Darling Downs and a few other southern localities.

LAMARCKIA, Mœnch.

(After J. B. Lamarck.)

Fertile spikelet 1-flowered, intermixed with sterile ones in little clusters on the very short branches of an unilateral spikelike panicle, the rhachis of the

spikelet glabrous inarticulate and produced above the flower, bearing a narrow empty awnlike glume and sometimes a 2nd rudimentary one above it. Outer empty glumes awnless, flowering one with a small dorsal awn. Sterile spikelets longer, with several truncate awnless empty glumes above the 2 outer acute ones.

The genus is limited to a single species, a native of the Mediterranean region.

L. aurea, Moench. (Benth. Fl. Austr. VII., 636.) A very elegant small tufted annual about 6 in. high, the one-sided dense panicle occupying nearly half the length. Outer glumes of the fertile spikelets $1\frac{1}{2}$ to $1\frac{3}{4}$ lines long, rather unequal, keeled, with short fine points; flowering glume inserted higher up, broad and convolute round the flower, with a fine dorsal almost terminal awn 2 to 3 lines long. Sterile spikelets rather longer, the 2 outer glumes like those of the fertile one, with several empty ones above them, all broad, obtuse, or truncate, elegantly distichous but not closely imbricate. *Cynosurus aureus*, Linn.; Sibth. Fl. Gr. t., 79; *Chrysurus aureus*, Beauv.: Reichb. Ic. Fl. Germ. t., 58.

Hab.: Introduced into several of the southern States, and during the past year into Queensland.

BROMUS, Linn.

B. mollis, Linn. (Benth. Fl. Austr. VII., 661.) An erect grass of 1 to 2 ft., more or less pubescent. Leaves flat. Panicle either small with few erect spikelets, or larger and at length drooping. Spikelets oblong or lanceolate, $\frac{1}{2}$ to $\frac{3}{4}$ in. long, somewhat flat. Glumes mostly about 7-nerved, but the nerves sometimes more in the flowering glumes, fewer in the outer ones, the flowering ones about 3 lines long, broad, and almost turgid, the fine awn about the length of the glume itself. Host. Gram. I. t., 19; Reichb. Ic. Fl. Germ. t., 74.

Hab.: Europe. Introduced and naturalised in southern localities.

BUTTONS FROM MILK.

Making pearl buttons out of milk is an industry of a creamery in New York State. All of the product of this creamery is used for buttons, and the owners are able to give farmers a good price for their milk. In preparing the button material the milk is placed in a large vat and mixed with rennet. It is kept at a temperature of 100 degrees until it is of the proper consistency. Then a fine white powder is added, and the whole thoroughly cooked for an hour. After this, the whey is separated from the curds, and the solid parts are packed in barrels, and shipped to a button factory, to be moulded into the desired shape.

Sour milk from the large dairies in England is sent to several large manufactories in the East End of London, and there curded very much after the fashion of making cheese.

This curd is then put under enormous pressure till every drop of moisture is wrung from it, when it is passed into a chemically-heated room. It is then, while under great heat, bleached white and flattened out, ready to be punched into the required shapes.

It is found that buttons can be made in this way at less than half the cost entailed in manufacturing bone ones, and, besides never rubbing away, do not turn their colour.

Tropical Industries.

SUGAR REGULATIONS.

A correspondent of the *Mackay Sugar Journal* supplies the following digest of the laws and regulations dealing with the sugar industry, which will be found useful and convenient for reference:—

Regulations 28th July, 1902; 11th September, 1902, and 8th January, 1903, cancelled.

"Grower" means producer of sugar-cane, and must be registered as producer under 25/9, Edward VII., Schedule II., Excise Act, 1901.

"White Grown Cane" means cane in the production of which white labour only has been employed after 28th February, 1903.

Or, in the production of which white labour only has been employed for twelve months immediately preceding the delivery thereof for manufacture.

Provided that no cane shall be considered white grown if—

(1) Produced on land cultivated by other than white labour, after a bounty has been paid for cane produced thereon.

(2) Or, if planted by other than white labour after 28th February, 1903.

"White Plantation" means plantation particularised in the "Notice of Intention to Claim Bounty." Bounty will only be allowed in respect of white grown cane and to the grower thereof.

"Notice of Intention to Claim Bounty and Plan" must be sent in in duplicate and witnessed, accompanied by a sketch plan in duplicate of whole of white plantation, showing in red areas any acreages of cane on which bounty is claimed. Must be given by "grower" to the State Collector of Customs—

(1a) As to cane planted before 1st March, 1903, or twelve months preceding delivery thereof.

(b) As to all cane subsequently planted before the planting thereof, or twelve months before the delivery for manufacture.

(2) Claim for bounty must be made not later than (1) one month from date of delivery for manufacture.

"Producer's Return."—Every producer, not later than 15th January in each year, shall furnish to collector a return in form of Clause 12. 6th October, 1903, Sugar Regulations.

EMPIRE GROWN COTTON.

The first annual meeting of the British Cotton Growing Association was held in Manchester lately, the Lord Mayor presiding. Among those present were Sir F. Lugard, High Commissioner of Northern Nigeria, Sir George Cotton, Sir Alfred Jones, president of the association, Professor Boyce, Mr. A. Emmott, M.P., and many representatives merchants, spinners, cotton-brokers, and leading officials of the operatives' associations.

The first annual report of the executive committee stated that there was every reason to be satisfied with the future prospects of cotton cultivation in the British Empire. It was decided last year to raise a guarantee fund of £50,000, to be spread over five years, as it was thought in that time sufficient experience would be gained to show whether it was worth while to continue further the work of the association. An appeal was made, and the sum of £31,198 had been subscribed. Considering the seriousness and urgency of

the situation, they felt fully justified in looking to the Government for a much larger measure of support in the near future. This was not merely a local question, it was a national one, the cotton industry being the most important manufacturing industry in the country, and, if anything were to cripple the cotton trade, it would seriously react on the prosperity of the whole country. There was also the Imperial side of the question, for, if the work of the association was successful, not only would it add to the prosperity of the mother country, but it would also greatly aid those colonies and dependencies from which supplies of cotton were obtained.

In proposing the adoption of the report, Sir A. L. Jones said that Lancashire, at the present time, was in a most critical position. Its cotton supply must diminish year by year, and in the face of that prospect the Cotton Growing Association had a special right to claim all the support needed in its endeavours to secure a supply of cotton from the British colonies and dependencies. (Hear, hear.)

Mr. Emmott, M.P., said that the amount of stoppage on account of shortage of material was greater than had ever been the case since the American cotton famine.

Sir F. Lugard, who was cordially greeted, said he was glad to have the opportunity of saying that, in common with all the administrators on the West Coast of Africa, and, perhaps, more so than any of them, he had the most cordial sympathy with that movement, not merely because he considered it from the Imperial point of view as a matter of enormous importance to the country he belonged to, but because Northern Nigeria, for which he was more particularly responsible, needed a staple industry. That staple should be cotton. For perhaps 1,000 years cotton had been grown there. The people understood its cultivation, and the soil was apparently suited to it. The population, which was upwards of 10,000,000, was industrious and notable as keen traders; and he hoped that as the country became more settled the people would settle down more to the cultivation of the soil, resulting in a greater output. The whole question turned upon the transport. The cotton-growing districts were far away from the waterway, and the cotton could not be profitably exported without some cheap means of transport. The best thing to provide, he thought, would be a light line—a tramway, if they liked—something which should be cheap and rapid in construction. Heavy railways might come later, when they had developed the trade which they knew was there. The Cotton Growing Association had, he understood, decided to send an expert to Northern Nigeria. He should welcome his arrival, and give him every possible facility in his power. (Cheers.) He hoped to hear from this expert what areas there were which were specially suitable for the cultivation of cotton. He could see which class of soil it thrived best in, and he could report to him how much of such country he came across in his travels. Then he could teach the natives how to clean the cotton, so that they could export a more valuable product than seed cotton in the rough. Transport, of course, was the ruling difficulty, and the cleaner they could ship cotton from those places of origin the more valuable it would be to them, as the same transport charges would not be increased. In Northern Nigeria he was not able to afford the facilities that some colonies could provide—paying for an expert, and so on—because the maintenance of the country was assisted by a grant in aid from Parliament, and every item of expenditure had to be sanctioned by the Treasury. It was not as if it was a paying country. It had been taken over only during the last two or three years, and they had not yet created sufficient revenue to meet their ordinary administrative charges. Therefore, they must look for help to those specially interested in cotton-growing. He would do all he could by giving his time and thought to the work, and every assistance in his power in the way of the export of cotton in Government vessels on the river. For other means of development, such as sending out an expert, presses, and seed, he must look to Manchester and to the Cotton Growing Association.

At the British Cotton Growing Association dinner in the evening, the Duke of Marlborough, responding to the toast of "The Colonies," said it was stated that last year we sold seven millions of unbleached cotton goods to foreign countries, and eleven millions' worth of the same goods to our colonies. That fact brought with it the ready consideration that not only should they employ the uncultivated areas of the British dominions for the purpose of supplying their raw cotton material to Lancashire spinners, but that they might look forward with a growing hope that the cotton in its manufactured condition should find its way back in increasing amount to their own countrymen in their own dominions beyond the seas. The effect of the association, with the willing co-operation of the Colonial Office, showed clearly that together they had not laboured in vain to afford some additional security in the future for a continued and ample supply of cotton for one of the greatest of British industries.—*English Exchange*.

THE COTTON WORM.

In the days when cotton was largely grown in Queensland, as we fervently hope it will again be grown next season, the bollworm, the cotton-bug, and the caterpillar were not unknown. In those days the farmers had not the advantage of the services of Messrs. Tryon, Benson, and other experts to tell them how to combat the pests. Conditions have now altered, and farmers who propose to grow cotton should not be deterred by the possible advent of these noxious insects and worms. In Barbadoes the trouble is very much in evidence, as the following article from the *Agricultural News* will show:—

Cotton in this island is just now seriously attacked by a caterpillar which eats the leaf. The insect spins its cocoon upon the leaf, drawing up the edges of a portion of it so that the pupa, which is inside, is entirely concealed. Certain fields have spots nearly stripped by this caterpillar, which is a voracious eater. When fully grown it is nearly $1\frac{1}{2}$ inches long, greenish in colour, with a dark stripe along the middle of the back, which varies in different specimens from a very faint black line on either side of the middle to a broad purplish black band, bordered on either side with a narrow whitish line, with a fine white line in the middle. This is one of the "loopers," or "measuring worms," and can easily be distinguished by its peculiar method of walking.

The remedies for this pest are the use of poison and hand-picking.

In certain cotton-growing states dry, undiluted Paris green is used as the poison. This is applied by means of cloth bags, at the ends of a pole long enough to reach two rows at once. A boy rides on a horse or mule between the rows and, by jarring the pole, dusts the poison on to the plants. This method has been very successful, and is in general use.

In Barbadoes good results have been obtained from the use of a mixture of Paris green with dry, air-slaked lime, applied by hand from a coarse cloth bag. This mixture may vary to suit the case in hand: for slight attacks 1 lb. of Paris green to 100 lb. lime; for severe attacks 1 lb. of Paris green to 50 lb. lime may be used. London purple may be used in this mixture. At the present time the supply of London purple and Paris green in this island is exhausted, and for the next few weeks hand-picking of the worms and pupæ will have to be practised. This is being done on several estates, and it seems to be entirely practical. After a little experience the labourer will detect the presence of the caterpillars on the leaf and of the pupæ rolled up in the leaf, and the work can be done rapidly. The insects, when caught, can be dropped into kerosene or lime water, and thus killed.

On one estate the practice of killing worms and pupæ on the leaves is being tried, and appears to give good results. This is done by squeezing them

between the thumb and finger; in this way the insect is killed and the leaf may be left on the plant. This method is much faster than the collecting, and does no damage to the leaf.

On most fields, at the present time, the majority of the caterpillars have reached maturity, and, having spun their cocoons, are now in the pupal stage. As it will be only a few days before the moths begin to emerge, and as each female moth lays a large number of eggs, the advantage of taking some steps to destroy as many of the pupæ as possible, while they can so easily be reached, will be apparent.

THE PAPAW.

In a country where the papaw thrives so luxuriantly as it does in Queensland, more especially in the North, all information concerning its value as a fruit, as a medicinal plant, and as a vegetable, cannot be too widely disseminated. The *American Journal of Pharmacy* has the following very interesting account of the papaw and its various uses:—

Quite universal is the knowledge of the unique property that has given to the papaw its world-wide fame—viz., the power of its milky juice to soften and dissolve tough meat. The statement has passed current in our journals that the emanations from this tree will dissolve and digest albumen, and that it is the custom of natives to hang meat and chickens in the branches of a tree to render them tender and edible. The natives often go further than this: they state that if male animals browse under the papaw tree, they thereby become emasculated. If we compare this statement with the alleged property of the roots as a generative tonic, we shall have a marvellous combination of an aphrodisiac and an anaphrodisiac in the same plant.

It is needless to urge that such stories are exaggerations of the pepsin-like properties of the fruit.

The native uses of the papaw are numerous and varied. The bark is used in the manufacture of ropes; the fruit is edible, and according to the local conditions, may be sweet, refreshing, and agreeable, or in other localities it is sickly, sweet, and insipid. The fruit finds a large consumption by the natives, and is considered very nutritious.

At the corner of a sugar-cane field, where the ragged canes bend over in a wild green, brown, and yellow tangle, there will be standing a papaw-tree, and, if the time of the papaw-tree has quite come, beneath the tree will be assembled a half-dozen negroes.

The ripe fruit is eaten as we eat melons. Salt enhances the flavour, and some users add sugar. The melons must be perfectly ripe when eaten raw, as the green fruit contains a strongly marked acrid principle. The colour of the ripe fruit is more or less that of our very yellow musk-melon. The sweetness of its resinous, pulpy juice clings to the tongue and remains prevalent for some hours.

The natives enjoy the flavour, while the stranger has to acquire the liking. Excellent preserves are made of the ripe fruit, which, for this purpose, is boiled down in sugar and candied (like citron).

At the sugar-houses slices of the papaw are often seen seething in hot syrup. The slices of melon combined with some acid fruit is made into native tarts, which articles correspond more or less to what we call "pies." The fruit is also stewed and served on the table. The green fruit is made into plain and spiced pickles, which are highly esteemed.

The fruit, just before ripening, is peeled and sliced, macerated in cold water, with frequent changes of water for some hours; the then macerated fruit is dropped into boiling water, boiled sharply, and then served as a vegetable.

As an article of food one finds the papaw prepared in a score of ways, making a variety of edible dishes, which, from the native standpoint, would be expressed in our language as "wondrous and nutritious delicacies."

A plant so universally distributed and possessed with such varied properties naturally takes an important place in the native *materia medica*.

The seeds are reputed as anthelmintic and emmenagogue; they are also used as a thirst quencher, form component parts of a drink used in fevers, as well as being used as a carminative. Syrups, wines, and elixirs made from the ripe fruit are expectorant, sedative, and tonic.

A malady, which the natives call the "cocoa bag," is a troublesome tropical disease, reputed to be hereditary and contagious; at all events, it seems to lurk in the blood of persons of otherwise apparently good health and habits. Suddenly the victim becomes a mass of offensive sores, debilitated, &c. The native doctors add the papaw fruit to the diet drinks used in this disease, and succeed in moderating its violence, at least. To the sores a paste made with the papaw milk as one of the constituents is also applied.

The slight pimples accompanying the first stages of the yaws soon spread into ulcerous sores that cover the entire body. Here, too, the claim is made that a slice of the papaw rubbed over the pimples will abort them. It is also claimed that the ulcers may be cleaned in a similar fashion.

I witnessed a most striking cleansing of a black foot in which the chiga had bored and laid its eggs, producing a mass of foulness beyond description. Here a paste of the papaw milk was pushed into the seething mass and kept there for forty-eight hours. It was then flushed, curetted, and antiseptics were applied. A clean wound, which readily healed, resulted.

The green leaves or slices of the green fruit of the papaw are rubbed over soiled and spotted clothes, and, by its power of dissolving stains, papaw has acquired the name of "melon bleach." The leaves or a portion of the fruit are steeped in water, and the treated water is used in washing coloured clothing, especially black. The colours are cleaned up and held fast.

The seeds are eaten as a delicacy. They have quite an agreeable taste, something of the order of water-cress, and a piquancy slightly suggestive of the mustard family. Macerated in vinegar they are served as a condiment.

The strange and beautiful races of the Antilles astonish the eyes of the traveller who sees them for the first time. It has been said that they have taken their black, brown, and olive, and yellow skin tints from the satiny and bright-hued rinds of the fruit which surround them. If they are to be believed, the mystery of their clear, clean complexions and exquisite pulp-like flesh arises from the use of the papaw fruit as a cosmetic. A slice of the ripe fruit is rubbed over the skin, and is said to dissolve spare flesh and remove every blemish. It is a toilet requisite in use by the young and old, producing, according to the words of a French writer, "the most beautiful specimens of the human race."

The meat in these countries is tough and tasteless, beef, mutton, pork, or fowl have the same flavour, and are as tough as hickory wood; boiling until they fall to pieces does not render them any more tender, they simply change from solid wood to fine tough splinters.

One reason for this is that in this climate meat must be eaten immediately after slaughter. (It often reaches the pot in an hour after killing.) The papaw helps to overcome this. Rubbed over tough meat it will render it soft, and change a piece of apparent leather to a tender, juicy steak. It is put into the pot with meat, enters into cereals, soups, stews, and other dishes, and they are made at least more edible and digestible.

The manufacture of Papain is described in Vol. XII., p. 418, of this *Journal*.

WEST INDIAN COTTON AT LIVERPOOL.

The Honourable Francis Watts has forwarded the following report by a firm of Liverpool brokers on a sample of cotton grown on Hothersal Estate, Barbadoes, received from Mr. H. Crum Ewing:—

We refer to ours of 25th August, and have to inform you that we got an excellent report on your sample, which is considered a particularly nice style of cotton, apparently grown from Sea Island seed. The sample is long and silky, and at to-day's value would be worth 14d. per lb.

With regard to your inquiry as to what the cotton would fetch when the market is in a normal state, the values would be ruled entirely by the supply and demand of Sea Island cotton, quite irrespective of prices for the ordinary American description—that is, middling American might drop 1½d. to 2d. below present quotations without influencing values for Sea Island cotton in any way, which has a special and limited market of its own. The range of value in Sea Island descriptions is very great, from 13d. for medium fine to 21d. for extra fine—probably at any period of the last twelve months cotton equal to your sample would have brought 13d. to 14d. per lb.

The further inquiry by us—"We think that the sample quality of cotton is being planted to a considerable extent in the West Indies, and we would like to know if the market could take it up at the price you indicate, if it came forward in large quantity"—brought the following interesting reply:—

"We are in receipt of your letter of 28th August, with inquiry as to the amount of cotton (equal to your sample) which this market could absorb at the value put upon it by our brokers."

The opinion here seems to indicate that spinners will take up all they are likely to have offered. The experience being that so little of this quality can be grown satisfactorily over a series of years. We give you the figures for Sea Island descriptions for the last four years—that is, total sales and prices (fine and extra fine), as follows:—

1900	...	...	...	350 bales, 13½d. to 21d. per lb.
1901	...	...	...	890 „ 13d. to 20d. „
1902	...	....	...	130 „ 13d. to 20d. „
1903 (to date)	...	...	...	280 „ 13d. to 21d. „

You will see that the quantity sold has not been large, and over the period named prices have kept remarkably steady.

This cotton is principally used for making a specially fine thread used in needle work and lace-working. It is an expensive article, and it is doubtful to what extent the demand would expand, without some shrinkage in value, if the supply were to be increased to any very large quantity.—*Journal of the Jamaica Agricultural Society.*

COTTON IN PORTO RICO.

According to the *New York Herald* it is anticipated that about 10,000 bales of "the finest Sea Island ever grown" will be the output of Porto Rico for the current season. It continues:—The best yields will exceed 1,500 lb. seed and fibre to the acre, and of sixty-eight experiment plots all will show a profit. Nothing but Sea Island cotton has been planted, and the tendency here is to encourage, as far as possible, the growing of that grade only.

Forestry.

WOOD PULP AND WOOD-PULPING MACHINERY.

Large quantities of the paper used for certain kinds of books, newspapers, and periodicals are annually made from wood pulp, and this circumstance has led to inquiries being made in this State as to the value and quantities of timber available in Queensland for a similar purpose. From what here follows, it will be noted that soft timbers of the pine family, birch, and poplar are the kinds used in Canada and the United States in the manufacture of paper.

We have, in Queensland, large areas covered with pine, besides several varieties of soft woods in our scrubs, which would appear to be the very kinds for paper-making. Thousands of pine-trees, hoop and Kauri, are annually cut in our scrubs for saw logs. Whenever a tree is felled for the mills, the heads are left to rot on the ground. In the case of large timber, especially of cedar, these heads generally contain hundreds of cubic feet in the large limbs which form reasonably large but short logs in themselves, much of it free from knots. Although it would not pay a timber-getter to waste time over these short logs, they would come in well for wood-pulping.

As to the question of the business becoming profitable in our State, since the industry has as yet not been undertaken even tentatively here, we can say nothing on the point. The Department of Agriculture has, however, obtained the information which we here publish, in response to inquiry which has been made on the subject.

THE WOOD PULP MILLS OF CANADA.

It was recently estimated that an issue of 200,000 copies of a popular novel led to the destruction of close upon 500 trees, each representing the growth of probably fifteen to twenty years. In the same ratio a tree would require to be cut down to create every 2,000 copies of the *Weekly Telegraph*. The story of how this consummation is brought about constitutes a curious chapter in the romance of engineering invention.

From a very early period portions of the variety of white birch known as the paper birch have been used for writing upon, as well as for many other purposes. Readers of Fenimore Cooper's works, for instance, will recollect the birch bark canoes mentioned in them, and after Christianity was introduced into North America the Indians further utilised the same material as a substitute for paper. So also, to this day, do the natives of the Himalayas, where a species of the tree grows up to beyond the snow line. It was not, however, until about a quarter of a century ago that civilised man began to take an interest in such woods for the purposes of paper production, but since then they have become the principal sources from which paper is obtained. Poplar and pine are used as well as birch, and are manufactured into pulp in Norway, Sweden, Germany, the United States, and Canada, but it is in the last-named that the industry has attained its largest and most interesting development. The area where it has taken the firmest hold is that vast extent in the provinces of Ontario and Quebec stretching from the Great Lakes northwards as far as the shores of Hudson's Bay; within which almost inexhaustible forests exist, the Quebec Government alone having 65,000,000 acres to dispose of. Much the greater part of this would, of course, be unexploitable for the profitable production of paper pulp were it not for the engineer, who, to begin with, has driven the Canadian-Pacific Railway across the fringe of it, and is now carrying branch lines into the heart of this wild country, which was previously largely inaccessible even to the Indians. The-

Government engineers, moreover, surveyed it thoroughly before the railways were made, and the authorities dispose of the lumber and pulp lands upon remarkably fair terms. They are divided into parcels of from 10 to 25 miles, and are sold by auction at rates which have recently reached 50 dollars per mile. The trees are felled mostly in winter, when snow and frost facilitate the moving of the logs to the mills established near water-power, of which there is abundance. There they are barked, and the knots removed from them by machinery, being thereafter cut into chips under an inch in size by revolving cutters. In this shape the wood is passed through rolls in order to dessicate it, and from them it goes, over screens which remove dust and sand, to boilers containing a solution of sulphurous acid, mixed with magnesia or lime, which has the effect of separating the vegetable fibre, or cellulose, which is the basis of paper, from materials foreign to it, leaving the pulp, which, after drying, is exported: the quantity which reached this country from all sources in 1901 being 22,422 tons, valued at £2,406,000.

It has been seriously argued that the destruction of forests involved in this process must not only have a serious effect upon Canada climatically, but must speedily lead to a paper pulp famine. As a matter of fact, however, the spruce and birch trees especially, renew themselves with extraordinary rapidity. Thus, fifteen years ago, 80,000 logs were cut from an area in Temiscamingue, near Mattawa, Ontario; yet, over the same land, which had previously been considered as cleared, 86,000 logs were procured last year, being the growth of the intervening period. Thus literature is not likely to lapse for lack of the material from which the engineer creates the paper on which to print it.—*Weekly Telegraph*.

The following article has been derived from the Encyclopædia Britannica and the Trade Catalogue of the International Paper Company, New York:—

In Europe the timbers chiefly used for the manufacture of wood pulp for paper-making are the Scotch fir (*Pinus sylvestris*), the spruce (*Picea excelsa*) poplar (*Populus alba*), and aspen (*Populus tremula*).

In America the black spruce (*Picea nigra*), hemlock (*Tsuga canadensis*), poplar (*Populus grandidentata*), and aspen (*Populus tremuloides*) are used for the same purpose.

There are two distinct processes for manufacturing paper from wood pulp—viz., by grinding the wood mechanically to powder without the use of chemicals, from which the cheapest kinds of paper are produced; and by the soda or alkaline or sulphite or acid process.

With the former, trees of medium age, varying from seventy to eighty years' growth, and from 8 inches to 24 inches in diameter, are usually selected. The trees are felled in winter, and reach the mill in logs of 4 feet in length. The logs are then freed from bark, and all knots taken out by machinery. After undergoing some minor processes, the blocks are next pressed against a grindstone revolving at a high speed, and ground into pulp under flow of water, which removes the fibre. The diluted pulp is then pumped over screens, which extract coarse fibre, grit, &c. From the screen the pulp passes to presses, which extract the water and reduce the pulp to thick sheets. The sheets are then folded in bundles. Sometimes the pulp is stored in liquid form instead of in bundles.

In the chemical process, after all bark and knots have been removed, the blocks are introduced to the "chippers," which cut the wood into cubical chips about $\frac{1}{2}$ -inch to $\frac{3}{4}$ -inch in size. The chips are then conveyed by mechanical means to the "digesters"—revolving vertical stationary boilers—where the wood is boiled for 7 or 8 hours in a similar manner to esparto or straw, but requiring severer treatment than these. Steam pressure, from 90 lb. to 150 lb. per square inch, is required, and, where caustic soda is the chemical used, about 16 per cent. of Na_2O , estimated on the barked and cleaned wood, is applied under a pressure of from ten to fourteen atmospheres. After draining off the lye from the fibre, the former is stored in tanks, and the soda recovered

by means of evaporation. When a solution of sulphurous acid combined with magnesia or lime is used instead of caustic soda, the boilers must be lined with lead or cement, owing to the corrosive nature of the acid. In either case the subsequent processes—washing, bleaching, and straining the pulp—are similar to those for esparto, which, roughly, is as follows:—

After the lye has been drained off and stored in tanks for recovery of the soda, the grass is put through the "Potcher," or washing engine, which corresponds with the breaking engine used for rags, where it is reduced to pulp. It is then washed for about 20 minutes, or until all traces of the chemicals used are gone. The wash water should finally come away perfectly clear. Bleaching powder or chlorine (about 6 to 8 per cent. on raw material) is run into the "Potcher," and the contents heated to 90 degrees Fahr. The bleaching takes from 4 to 6 hours. Then further washing to remove chlorine, for which a little antichlor is generally employed. The pulp is then pumped over long, narrow, serpentine settling-tables, with divisions or weirs to catch any impurities it may contain. The pulp is then drawn by suction over a machine fitted with coarse-cut strainers, and flows on to wire cloth in the form of a thick web or pulp. It then passes through the couch and press rollers, which leave about 70 per cent. of moisture in the pulp, which is then ready for the heating engine, where the first step in paper-making commences.

There are in operation in the United States 1,115 paper and pulp mills, with an annual output of 2,500,000 tons of paper, of which by far the greater quantity is made from wood pulp.

THE TRAINING OF FOREST OFFICERS.

The following letter by Mr. W. Thurns, Kew, is taken from *Nature* by the *Tropical Agriculturist*, Ceylon:—

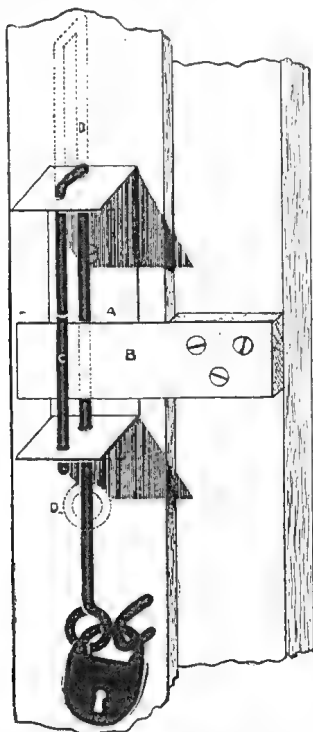
TRAINING OF FOREST OFFICERS.

In a sympathetic notice in the *Indian Forester* of the late distinguished Inspector-General of Forests in India, Mr. H. C. Hill, Sir Dietrich Brandis stigmatises as "absurd" "the idea which, until a short time ago, was current in England, and which to this day is held by many English botanists, that a good botanist must necessarily be a good forester." I quite agree that the idea is absurd, but as I am probably better acquainted with the English botanical world than Sir Dietrich Brandis, I doubt very much whether the idea was ever current in this country, or is held at the moment by many English botanists. For my part I entirely dissociate myself from it, as I know many accomplished botanists who would probably make very indifferent forest officers. I am more able to agree with Sir Dietrich Brandis when he says: "A forester, more than almost anybody else, must use his eyes, and must be able on the spot to draw conclusions from what he has observed. But the power of observation is by no means possessed by every one. A further requisite, in which I think Sir Dietrich Brandis also agrees, is sympathy with and pleasure in forest nature for its own sake. It appears to me that neither point is kept in view in the present mode of recruiting the Indian Forest Service. Sir Dietrich Brandis lays great stress on sport, and unless it becomes too absorbing a pursuit it undoubtedly fulfils the conditions I have stated. It would, however, be as undesirable to insist that every forest officer should be a sportsman as that he should be a botanist. But I entertain a very strong opinion that a forest officer will never rise to the highest level of efficiency in his work unless he has a scientific grasp of the principles which underlie it. He should be able to identify the trees which compose the forest vegetation under his charge, and for this purpose he should have such an elementary

acquaintance with botany as will enable him to use intelligently the book which Sir Dietrich Brandis has been, for several years, occupied at Kew in preparing for that purpose. He should further have some knowledge of the nature and conditions of vegetable life; he should grasp the idea that a tree is a living organism, the growth and development of which are subject to adverse or favourable conditions. He should further have some idea of the enemies and diseases by which trees are liable to be attacked, and of how these attacks can be met. All this a man of ordinary intelligence can acquire, if he possesses a real taste for Nature, without rising to the level of the professional botanist, which it would be absurd to demand of him. There is the same fallacy underlying the view that mere administrative efficiency is sufficient for a good forest officer as in thinking that mere mechanical drill, without resource or initiative, will make a good soldier. As I have felt it my duty to urge these views officially, I shall be glad to state them more publicly. I should like to take the opportunity of expressing my regret at the untimely death of Mr. H. C. Hill, the late Inspector-General. Largely as the result of my personal persuasion, he accepted a mission in 1900 to initiate a scientific forest administration in the Straits Settlements. His reports were of the highest value, and will be a permanent basis for the future forest policy of that part of the Empire.

A SERVICEABLE GATE LATCH.

The gate latch here illustrated was designed and described by Mr. H. R. Stephens, Toowoomba. It is made by bending a piece of $\frac{1}{4}$ -inch, or even larger-sized round iron to the shape shown in the sketch, and fitting it into a bracket made of 1 inch by $\frac{1}{8}$ -inch flat iron for small sizes. When the



gate is shut, it is secure, and may be padlocked by putting a staple at the lower bend, as here shown. A is a bracket fitted to the gate post; B, a plate fixed to the gate; C, a bolt fastening the gate when down; D, the bolt raised to release the gate; E, gate post; F, the gate.

Entomology.

GRASSHOPPERS—THEIR HABITS AND REMEDIES.

In many countries of the world locusts and grasshoppers cause incalculable damage to the crops at certain seasons of the year, and entomologists have spent much time and labour in investigating their life-history, their habits, and various remedies for their destruction. In October, 1902 (*Journal*, Vol. XI., p. 260), we printed an article supplied to *Garden and Field* by Mr. C. French, entomologist to the Victorian Government, on the preparation and use of the fungus used in Cape Colony for the extermination of locusts, in which he describes the effects of its application to the destruction of grasshoppers in Australia.

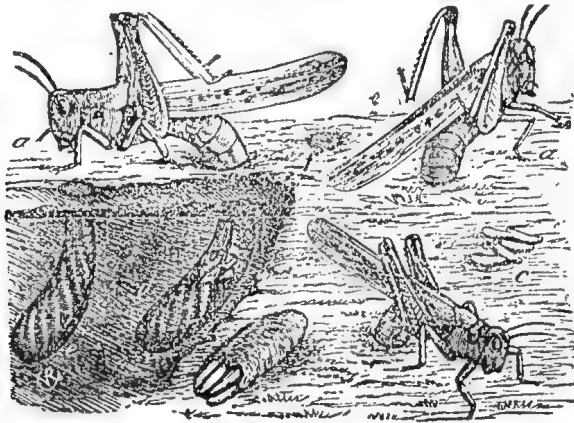
Under the above heading, Mr. C. P. Gillette, of the Agricultural Experiment Station at Fort Collins, Colorado, U.S.A., has issued a bulletin which we think will be of much interest and value to our readers, many of whom have suffered considerably from the grasshopper pest.

Mr. Gillette writes:—

The several injurious species of grasshoppers occurring in Colorado undoubtedly occasion heavier annual loss than any other single insect pest, not excepting the codlin moth. It is the object of this brief paper to give the most important information as to the habits of these destructive insects, and the remedies that may be used against them.

LIFE HABITS.

All our specially destructive grasshoppers spend the winter in the egg-state in the ground. The eggs are from about 3 to 4 16ths of an inch in length, cylindrical in form, yellowish-white to yellowish-brown in colour, and are deposited in compact masses of from about twenty to as many as seventy-five. The females dig small holes to the depth of an inch, or a little more, with the stout ovipositor at the tip of the abdomen. The abdomen is then thrust in as far as it will reach, and a gluey material is exuded and smeared over the



inner wall of the little cavity, making it firm. Then the egg mass is deposited, and it is also covered with the gluey material, which soon hardens, and protects the eggs from excessive moisture and from being easily crushed. Egg-laying of some of the species begins about the first of August, and continues until hard freezing late in the fall kills all the old females. As a rule, a single female deposits two packets of eggs.

The places most chosen by the females for the purpose of egg-laying are ditch banks, the borders of fields and roadsides. The egg packets are also most often found about the roots of plants, as alfalfa, clover, or weeds. If the eggs are at all abundant, a little digging about such plants where the grasshoppers were numerous in the fall will usually reveal them.

The eggs begin to hatch about as soon as vegetation starts in the spring, and continue for several weeks, but the eggs of a single pod all hatch together. The young hoppers begin at once to feed upon such tender-growing plants as are at hand, various common weeds entering largely into their diet. When young and wingless, they are inclined to remain rather close to their place of hatching, but as they grow they scatter about more, and may become quite evenly distributed through a large field. The tendency to remain together in large flocks is more or less marked, however, and particularly is this noticed late in the afternoon, when they congregate along the borders of the fields and upon the fences to spend the night. So marked is this habit that, where grasshoppers are abundant, it is a common sight to see a strip from 10 to 30 or more feet wide about the borders of an alfalfa field that is almost denuded of vegetation. Sometimes the grasshoppers do great damage by ascending trees and eating fruit and foliage, and gnawing the tender bark from the twigs. Such injuries usually occur alongside an alfalfa or pasture field from which the grasshoppers have migrated.

REMEDIES.

There are many remedies that may be used to advantage against grasshoppers. Which is best to use in a given case depends upon circumstances. It may be best often to use a combination of remedial or preventive measures.

The best of all artificial remedies, where it can be used, is ploughing deeply, late in the fall or early in the spring, all the ground where the eggs are abundant. Even the young hoppers, when very small, may be turned under quite successfully in this manner and destroyed.

Where ploughing cannot be resorted to, a thorough harrowing, especially with a disc harrow, will do much to destroy the eggs. Some will be crushed, others will be eaten by birds, and still others will succumb to the freezing and thawing and drying when separated from the egg mass. These remedies must be applied before the young hoppers hatch.

DESTRUCTION OF THE GRASSHOPPERS.

Burning.—When the grasshoppers are quite small, and travel slowly, they may be killed along ditch banks, and in other places where they are abundant, by covering the ground with straw and then burning it.

Poisoning.—Young hoppers may also be poisoned in large numbers by thoroughly spraying the young weeds and other vegetation on the waste land where they are hatching in large numbers with any of the arsenical poisons as Paris green, arsenite of lime, arsenate of lead, &c. The poisons should be used rather strong. Later, when the hoppers get into the crops, they may be poisoned quite successfully by the use of the arsenic bran-mash. Mix 1 lb. of Paris green, or white arsenic, with about 20 lb. of bran, moisten enough with water so that the particles will adhere together in a crumbly mass, and then sow broadcast where the hoppers are most abundant. Do not use this where chickens feed.

Bandages.—To keep grasshoppers out of trees, bandage the trunks with cotton-batting, or printer's ink, or axle-grease. If either of the last two named substances is used, do not put it on the bark of the tree, but upon heavy paper, which is first wrapped about the trunk. If the hoppers jump or fly into the trees, using poisonous sprays or driving them with whips will have to be resorted to.

Hopper-dozers.—For open fields, the hopper-dozers, or catchers, are probably our best remedy, after the grasshoppers have hatched. A cheap and simple form of hopper-dozer, which is probably as effectual as any, is shown in Fig. 2. The pan is made of sheet iron, and the back is extended by means of upright stakes and a strip of muslin. In this pan is placed a quantity of kerosene or crude petroleum, or a small amount of water with oil upon the surface, and the pan or dozer is then drawn over the field by hand,

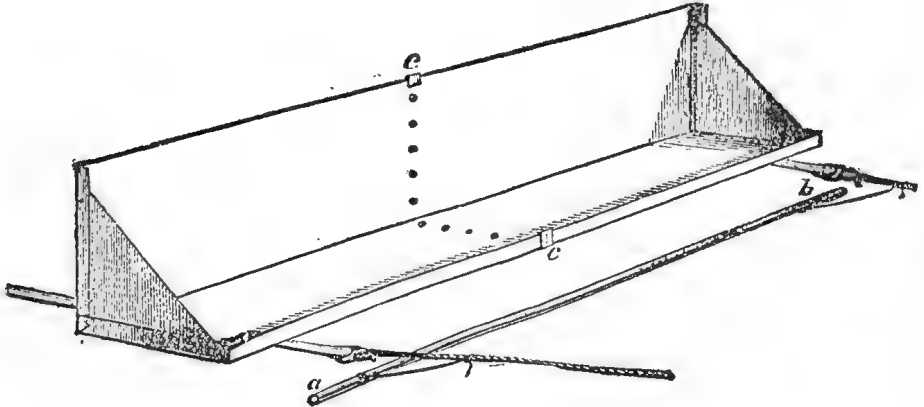


Fig. 2.

or by means of a couple of horses kept well apart, so as to collect the grasshoppers. If the horses are in front of the middle of the pan, many of the hoppers will jump out at the sides, and escape the pan. Every hopper that gets wet with the oil dies. Many will jump into the oil and jump out to die. When they become abundant in the pan, they should be thrown out.

Another type of hopper-dozer, which is much liked by many who have used it, catches the grasshoppers alive in a box. It is manufactured by a Mr. J. H. Behrens, Evans, Colorado, and costs about 12 dollars (£2 10s.).

Grasshopper Diseases.—The African grasshopper fungus was experimented with quite extensively last summer in Colorado, nearly 400 tubes of the fungus being sent out to those requesting a quantity for trial. The station also used a number of tubes, endeavouring to spread the disease among the grasshoppers about Fort Collins. There is very little evidence that the disease became destructive to the grasshoppers in any case where it was used. There is a native grasshopper disease that is generally distributed over the country which did kill great numbers of grasshoppers in nearly all parts of the State last year. It is a peculiarity of this disease that it causes its victims to crawl to the tops of plants to die. If this disease does not occur in a locality where grasshoppers are abundant, it might be well to obtain a quantity of the dead hoppers from this disease, crush them as finely as possible in water, and sprinkle the decoction over the living hoppers and food plants where possible, especially upon low ground, and just before dark.

CURE FOR STOCK WHICH HAVE EATEN POISONOUS PLANTS.

It has been discovered, by a series of careful experiments made by the Bureau of Animal Industry in the United States Department of Agriculture, that if a small tablet, consisting of permanganate of potash and sulphate of aluminium be promptly administered, loss of stock through the eating of poisonous plants is to a great extent averted. The action of the permanganate is to oxidise and destroy the poison still remaining unabsorbed in the stomach, and this action is intensified by the sulphate of aluminium.

Animal Pathology.

FUNCTIONS OF FOOD AND HOVEN.

By WILMOT C. QUINNELL, M.R.C.V.S. Lon., Government Veterinary Surgeon.

(A paper read before the Drayton and Toowoomba Agricultural and Horticultural Society, Toowoomba, 8th October, 1903.)

The animal body demands, both for its own support and for the *liberation* of *energy*, supply of *carbon*, *hydrogen*, *oxygen*, and *nitrogen*, along with smaller quantities of other elements.

Here we have the standing miracle which life presents in even its lowest forms, the transformation of *dead matter*, either first or second hand, with *living tissue*, and, since foodstuffs have to be changed into living animal tissues, it is necessary that they should contain the same elements, and that the combining portions of the elements in our food be nearly allied to the proportions of the elements that form our bodies.

The animal body is composed chiefly of the *four* elements—carbon, hydrogen, oxygen, and nitrogen. The supply of oxygen and hydrogen is easily obtained from the *air* we breathe and the *water* we must necessarily take in with our solid food, but we must regulate our solid foodstuffs discriminately, in order to obtain the proper proportions of *carbon* and *nitrogen* with the least waste.

For the sake of health, medicines are taken by weight and measure, so ought food to be taken by some similar rule.

REMARKS ON VEGETABLE FOODS.

Almost every part of plants furnishes food, but more especially the seeds, roots, and stem. Plants which furnish their seeds as food belong to the two great divisions, *cereals* or grains, and *Leguminous* plants or pulse.

Cereals, called after Ceres, the goddess of corn, comprise all grain or corn-bearing plants. They are really *grasses*, which by special cultivation have developed a maximum of food material with a minimum of husk, and they have been cultivated from remote antiquity, the use of *millet*, lentils, and barley being pre-historic in origin.

Vegetable foods contain all the *proximate principles*, but are specially rich in carbo-hydrates.

CLASSIFICATION OF FOODS.

Class.	Proximate Principles.	Functions.
Nitrogenous.	1. <i>Albumens proper</i> C : N :: 2 : 7	<div>Albumen Fibrin Myosin Syntonin Globulin Casein Glutin Legumin</div> <div>Formation and repair of tissues. Regulation of absorption and utilisation of oxygen. <i>May</i> form fat under special conditions. Partially converted into <i>peptones</i> in digestion.</div>
	2. <i>Gelatins</i> C : N :: 2 : 5½	<div>Gelatin Ossein Chondrin Keratin</div> <div>Same functions as above, but much less perfectly—about one-third only.</div>
	3. <i>Extractives</i>	<div>...</div> <div><i>Essential</i> as regulators of digestion and assimilation, especially with regard to gelatins.</div>

CLASSIFICATION OF FOODS—*continued*.

	Class.	Proximate Principles.	Functions.
Non-nitrogenous.	II. FATS C 79%. H 11 O 10	... { Olein Stearin Palmitin }	{ Supply of fatty tissues. Supply energy and heat by oxidation.
	III. CARBOHYDRATES C 40%.	1. { Amyloses: Starch, dextrine, cellulose, &c. Sucroses: Cane-sugar, maltose, lactose Glucoses: Dextrose, levulose Oxalic, tartaric, citric, and malic acids (excess of oxygen) Acetic and lactic acid (defect of oxygen) }	{ Supply of energy and heat by oxidation. Supply of fat by reduction. Converted into <i>dextrose</i> in digestion.
		2. Vegetable acids	{ Preserve alkalinity of the blood.
Mineral.	IV. SALTS	{ Chlorides, phosphates, &c., of potassium, sodium, calcium, &c.	{ Various uses.
	V. WATER	...	{ Formation of tissue. Solvent action.
	AIR		

All plants contain, often in large proportions, *cellulose* or vegetable fibre, familiar as cotton-wool and paper. When *very young* it may be digested, but with growth it becomes woody, and is not only itself indigestible, but *hinders* the *digestion* of other substances.

The *salts of plants* are characterised by excess of *potash* and *phosphates*.

In animal foods, on the other hand, soda and chlorides are the predominating salts, so that *herbivorous* animals require to supplement their vegetable diet by the use of *common salt* or *sodium chloride*. Therefore, salt is absolutely necessary for stock at all times and in all places, either separately or in their food. They will require it, especially in the *spring*, according to Willard, for then, he says, there is less saline matter in the pastures than at other times.

The vegetable foods may be given to our domestic animals in the *fresh* state, containing their natural juices, when they are termed *green fodder*, or after having been dried by the sun, when they are called *dry fodder*.

Green fodder is especially adapted for all ruminants, and for young horses, after completion of the first year.

Scarcely any *single green fodder* is, however, suited for forming the *single food* for stock.

Age of fodders not only occasions loss in absolute amounts of *nutritive constituents*, but also *diminishes* their relative digestibility.

Even good green fodder may bring on an attack of "*Hoven*," or other gastric troubles, in any cases where animals, which have *fasted for a long time*, are supplied with a large amount.

"An artificial mode of existence forces on animals predilections which in a state of nature are not observed." In nature they are essentially moderate in their desires, but under domestication *will eat* what they would in a state of nature avoid, and never appear to be satisfied.

Stock will sometimes kill themselves by over-eating when food is continually placed before them, but that is only when they are, from their surrounding circumstances, relieved from travelling for food and water.

PHYSIOLOGICAL CONSIDERATION OF THE PROCESS OF DIGESTION IN RUMINANTS.

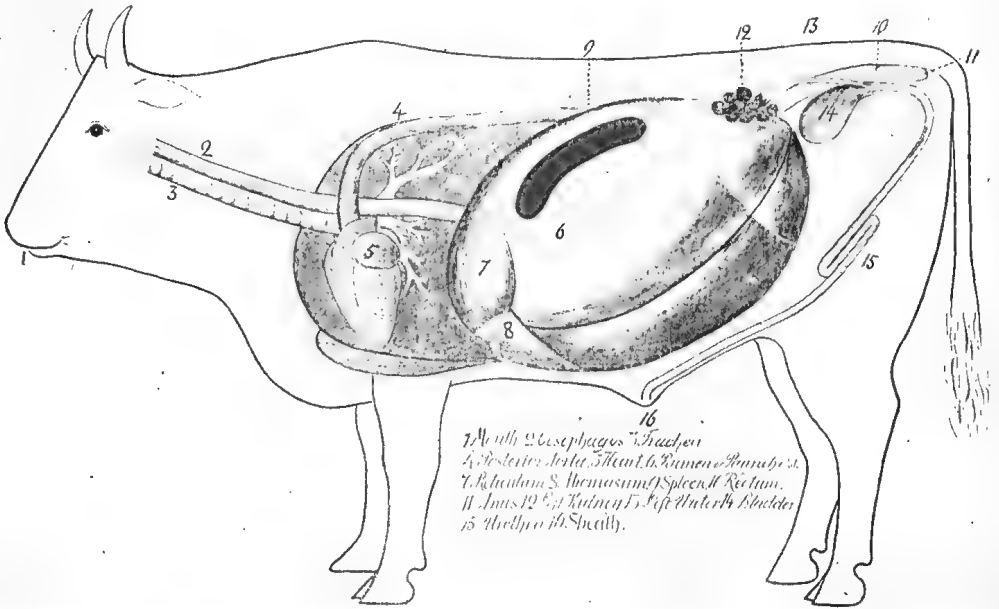
Alimentation is the process of receiving or taking nourishment. It may be divided into *digestion* and *absorption*.

Digestion is the preparation of food for absorption. *Absorption* is the process by which the digested food enters the circulation.

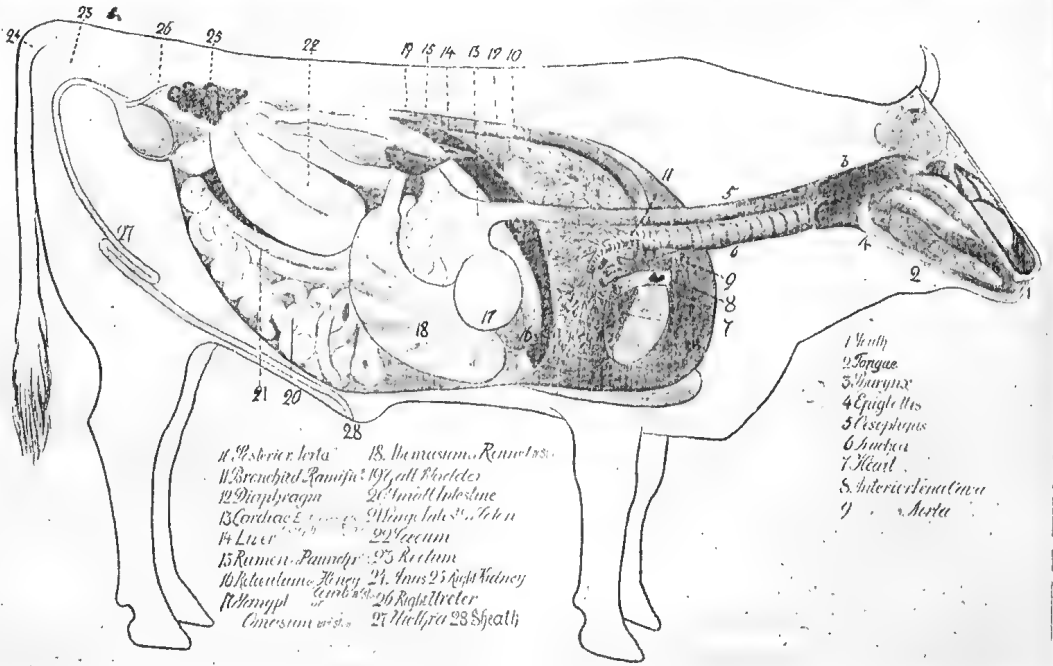
The different steps of digestion are—(a) *prehension*, the process of transferring the food to the mouth; (b) *mastication*; (c) *salivary digestion*; (d) *deglutition*, or swallowing; (e) *gastric and intestinal digestion*; (f) *absorption*; (g) *defecation*, or expulsion from the body of the residue not required for alimentation.

Plate V.

1.



2.



FUNCTIONS OF FOOD AND HOVEN.

DIGESTION.

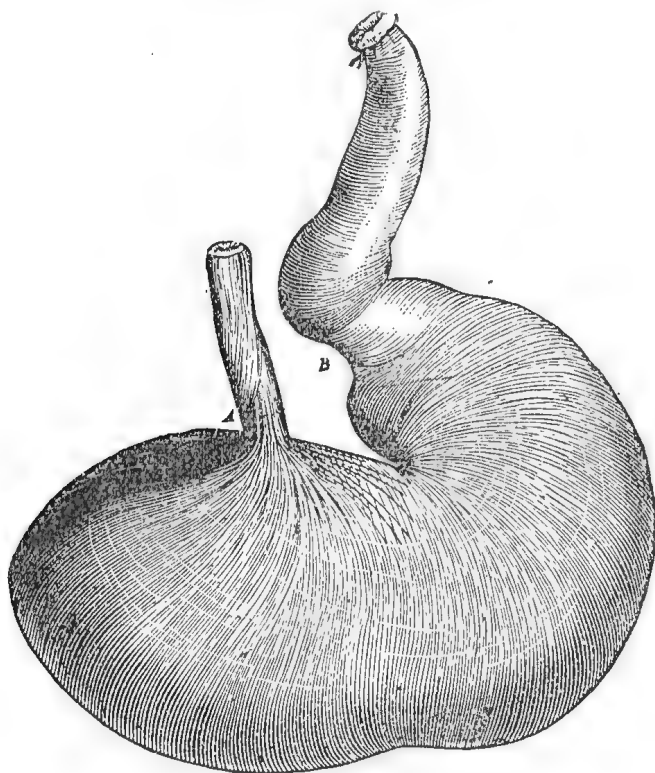
PROCESS.

1. Food partly chewed and moistened with *saliva* in the mouth. (Plate V., 11.)
2. Food swallowed and passed into *paunch* to macerate. (Plate V., 13, 15.)
3. Food made into *pellets* by honeycomb bag (Plate V., 16); passed back to the mouth, again chewed and mixed with saliva.
4. Food again swallowed and passed into *manyplies*. (Plate V., 17.) Finer portions proceed to fourth stomach. (Plate V., 18.) Coarse parts return to be re-chewed.
5. Food in fourth stomach acted upon by *gastric juice* becomes *chyme*.
6. *Chyme* passed into *intestines* (Plate V., 20, 21), acted on by *bile* (19), and *pancreatic* juice becomes *chyle*.

EFFECT.

1. Starch changed to sugar by action of saliva.
2. Softening food.
3. Food finely divided and *more starch* changed to *sugar* by action of saliva.
4. Separation of coarse and finely divided portions of food.
5. Part of starch and nitrogenous matter absorbed into the blood.
6. Fats rendered soluble, and all nutritious portions absorbed into the blood and other vessels.

From the above it will be seen that the *stomach* is composed of no less than *four* compartments, being quite different from the *simple* stomach of the horse or pig, they being examples of farm animals that do not chew the cud.



DIAG. A.—STOMACH OF THE HORSE

A, Cardiac extremity of the œsophagus.
B, Pyloric (a gatekeeper) ring.

FUNCTION OF THE STOMACH IN RUMINANTS.

I cannot pretend to give here a complete history of the phenomena of rumination, but must confine myself to describe in a few words what are the principal attributes of each gastric dilatation.

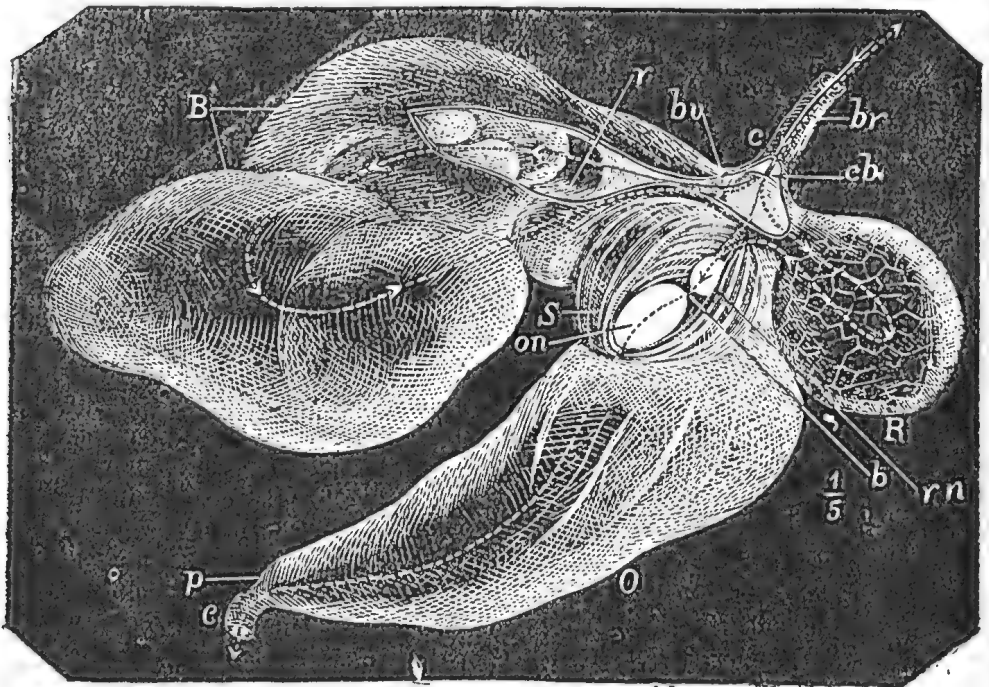
I.—The Rumen, vulgarly designated the *Paunch*, is a sac where the aliment taken during feeding-time is kept in reserve, and whence it is again carried into the mouth during rumination, after having been more or less softened. (Dia. B, B.)

II.—The Reticulum (Honeycomb) participates in the functions of the Rumen, to which it is only a kind of accessory apparatus (diverticulum). But it is particularly with regard to liquids that it plays the part of a reservoir, the solid substances contained in it being always diluted by a large quantity of water. (Dia. B, R.)

The *Œsophageal Groove* carries it to the omasum, the substances swallowed a second time, after rumination, or even those which the animal ingests in very small quantity for the first time. (Dia. B, bv.)

III.—The Omasum (Psalterium, Many Leaves, or Bible) completes the trituration and attenuation of the food by pressing it between its leaves. (Dia. B, S.)

IV.—The Abomasum (reed or rennet bag) acts as a true stomach charged with the secretion of the gastric juice; in this reservoir occur the essential phenomena of *gastric digestion*. (Dia. B, O.)



DIAG. B.—THE STOMACH OF FULL-GROWN SHEEP INFLATED AND DRIED (THANHOFFER).

B, Rumen; R, Reticulum; S, Omasum; O, Abomasum; e, Cardiac orifice; p, Pylorus; br, Œsophagus or gullet; cb, Cardial valve; bv, Œsophageal canal; r, Pillar of the rumen; rn, Opening of the reticulum; on, Opening of the abomasum; b, Valve between reticulum and omasum; e, Duodenum.

The average collective capacity of the four compartments in an ox is not less than 55 gallons, and thus the greatest part of the abdominal cavity is taken up by them.

The cavity of the paunch, or rumen, is by far the largest of the four stomachs. Many contain as much as 200 lb. of material, and constitutes about nine-tenths of the space represented by the ruminant stomach. Plate V., Fig. 1 (6). Although the four gastric reservoirs of the ruminant are *automatically* connected, they are, to a certain point, functionally isolated. Each one of them has tolerably distinct functions to fulfil, and, as already stated, the first three are concerned in the storing of foods and liquids in rumination, while in the fourth *alone* true digestion takes place. This may occur during *rumination* or during *inaction* of the first three stomachs.

In order that *rumination* may take place, the stomach must be distended with food, otherwise the walls of the rumen will be flaccid and the abdominal muscles will be ineffective in aiding in the passage of the bolus or cud upward through the gullet. Since, then, *no digestion* or *absorption* occurs within the first three gastric compartments, an animal under such a condition might die of hunger with its rumen or paunch still almost filled with food.

On the other hand, the paunch must not be very much distended, or *its walls* will be *paralysed*, and will be prevented from reacting on its contents.

Ruminant animals must always be well supplied with *water*, and their *secretion of saliva** must be active.

Rapidly-grown grasses from irrigated meadows distend the rumen far more in proportion to their solid element than other forms of food.

The distended paunch, however, soon diminishes in size, and then appears very empty, and animals cannot ruminate as effectually as with harder and drier food, as a certain bulk is required to permit of regurgitation.

Rumination does not, as a rule, commence until after the animals have been *watered*, unless fed on *green fodder* or *succulent roots*, and even then they sometimes require water.

Ruminant animals are very *timid* and easily frightened, so very slight causes will arrest rumination.

Again, *slight* maladies prevent rumination, as do *excessive* food and guses in the stomach, *venomous* or narcotic plants, *forced marches*, *fatigue*, *rut*, and suffering of all kinds.

Even the separation of a mother from her young has been known to temporarily *arrest* rumination.

The longer rumination is postponed the more difficult is its recommencement, since *food* becomes *dry* and *compactly packed* in the *rumen* and the *omasum* or *Bible*, their *membranes* become irritated.

CONNECTION BETWEEN THE STOMACH AND THE BRAIN.

Nervous system, the mechanism by which an animal acquires a knowledge of the external world, and by means of which the great functions of the absorption of the food, the elimination of waste products from the body, the respiration, circulation, and muscular action, are regulated and controlled.

The *Cerebro-spinal* system consists of the brain, cord, and the various nerves, and presides over *animal life*. (Dia. C, Fig. 1.)

The *Sympathetic* presides over nutrition, organic or *vegetative life*. (Dia. C, Fig. 2.)

This second system consists of a double chain of ganglia, one on each side, placed along the spinal column from the cranium to the coccyx, and connected to each other by nervous cords.

Each ganglion is connected not only with the one immediately before and behind it, but also with the cerebro-spinal system by one or two filaments.

From these ganglia the nervous filaments are given off, which pass to the thoracic, abdominal, and pelvic viscera. There are two theories as to the reason why indigestion, when accompanied with digestion of the stomach, affects the brain.

* Colin places the average daily secretion of saliva in the horse at 84 lb. and in the ox at 102 lb.

The branches of the Par Vagus or Pneumogastric nerve ramifying over the stomach, lungs, and heart. (Dia. C, Fig. 2, *so. pl. ca.*)

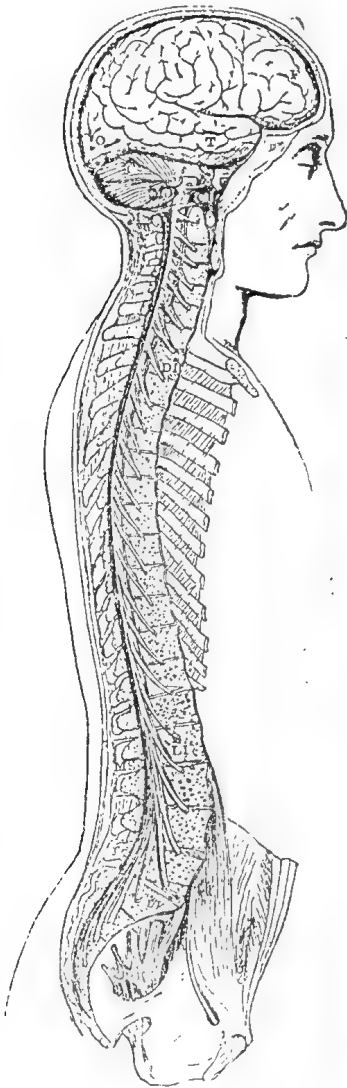


Fig. 1.

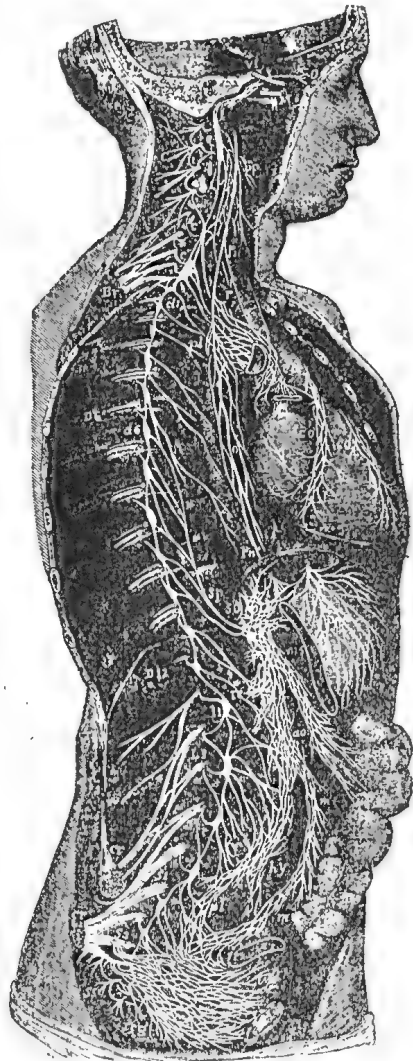


Fig. 2.

DIAG. C.

Fig. 1.—The cerebro-spinal cavity and its contents.

Fig. 2.—The sympathetic system, the right lateral walls of the chest and abdomen being removed to bring it in view.

When the stomach is distended, this nerve is unduly and continuously pressed upon, and so gets into a torpid state, and the lethargic symptoms of comatose staggers are supposed to be the result, by reflex nervous action.

Others think that the distension of the stomach prevents the *action* of the *diaphragm* or midriff, and the proper extension of the chest in inspiration.

Hence the blood is insufficiently purified, and the vital fluid supplied to the brain is more or less impure.

Hence, also, there is decreased power and consequent *torpidity* of circulation; for these results depend on nervous tone and power; and from these causes, it is thought, arises coma.

The former, however, is the more probable explanation.

Ruminants are more liable to suffer from disorders of the stomachs than from disturbance of the function of the other portions of the alimentary canal, the reason being that the stomach, as has been previously pointed out, is a very complex and important organ in these animals. Horses, on the contrary, are more frequently troubled with derangements of the intestines.

Again, the symptoms of digestive derangement differ considerably in veterinary patients of the same species, referable to certain physiological idiosyncrasies.

Fodders, when injudiciously fed, may produce the following disorders:—

(a) *Engorgement of the Paunch, with or without Tympany*;

(b) *Acute Tympanitis—Hoven or Blown*.

ENGORGEMENT OF THE PAUNCH WITH AND WITHOUT TYMPANY.

Engorgement of the rumen is a condition of distension of the paunch or first stomach in consequence of the presence of *too* much solid material in that organ.

This arises from taking in too much food or from rapid eating, especially of succulent food.

And the consequence is that the muscular coat of the rumen, not being sufficiently powerful (often associated with a want of vitality in the system) to contract on the contents of that organ, movement of the solid mass and digestion altogether cease.

More particularly it is the case that animals which have previously been feeding upon *dry* food and are suddenly put upon *luxuriant pasturage* are very liable to suffer from this derangement.

The oppression of the animal is greater than it is in the case of *Tympanitis*, and the belly is not usually so greatly distended, nor the flanks yield to pressure. The rumen has a soft doughy feel, and this enables the examiner to distinguish between the soft mass in the case and the gas in the other (Hoven).

Symptoms—Engorgement.—The onset of the symptoms is more gradual than it is in cases of tympany, the disengagement of gases being a more rapid process than is the filling of the paunch with solid food owing to a voracious appetite.

However, the usual signs are marked, excitement, delirious, and drowsy. Breathing laboured, dilated nostrils, dry muffle, a swaying of the body forwards and backwards. Then the animal stretches out the neck, protrudes the eye, the pupil becomes very much dilated, giving the animal a glassy stare rapidly followed by coma. There may be at times temporary delirium, and this may be accompanied by attempts to do mischief, rushing blindly into objects. Finally, the animal staggers, rolls on its side, and lies there with rigid limbs, is convulsed, and dies.

Owing to the rapidity of the malady, engorgement of the rumen in oxen is a disorder which is not easy to treat medicinally. A draught as follows has proved useful—Epsom salts, 16 oz.; solution of aloes, 4 to 8 oz.; powdered ginger, 1½ oz.; aromatic spirits of ammonia, 1½ fluid ounces. In warm gruel, to be given slowly and carefully. Left side of the animal should be well rubbed, and exercise. Failing all, the operation of *Rumenotomy** or *Paunching* must be performed by a duly qualified veterinary surgeon.

Prophylaxis or Precautionary Measures.—This may be dismissed in a few words: Common sense regulation of feeding.

(B.) *Tympanitis—Hoven or Blown*—

is the unnatural distension of the rumen or paunch with gaseous matter.

The cause appears to be the suspension of the natural peristaltic action of the stomach, and the consequent elimination of gaseous matters from the

* Cutting an opening into the paunch for the purpose of a mechanical removal of its contents.

accumulated ingesta. It occurs mostly when the herbage is fresh and plentiful, and full of rich, juicy matter. Amongst other predisposing causes may be mentioned—animal very low in condition, and *insufficiency of salt supply* to stock.

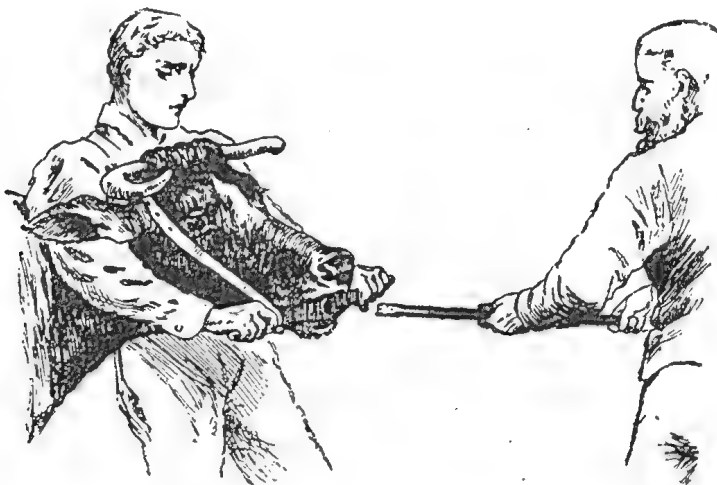
Distension of the paunch from overfeeding seems to be the primary cause of hoven.

The herbage is rich and succulent, the animal eats eagerly, the food is insufficiently masticated, fermentation takes place, and gas is formed, the paunch is blown up like a bladder, the animal suffers intense agony, gets up and lies down, respires with difficulty, and ultimately death by asphyxia, induced by pressure of the paunch on the lungs by the medium of the diaphragm (midriff) or from absorption of noxious gases into the blood.

It is necessary for every agriculturist to be thoroughly acquainted with and capable of employing prompt remedies, as cattle may die in a comparatively short space of time in such cases, unless immediately attended to.

In early stages of the disorder.—Diffusible stimulants administered promptly are efficacious in dispelling accumulated gases—viz., whisky or brandy, or, when procurable, a full dose of ammonia, ether, or chloroform in solution.

Exercise and friction to abdomen hastens expulsion of gas. Introduction of hollow probang allows escape of gas when the amount of food in the stomach is limited.



DIA. D.

In order to depict more clearly in the above illustration the manner in which the operation of passing the probang is performed, some very necessary details, which would be absolutely essential in actual practice, have to be omitted.

In extreme cases.—When distension and distress are present, puncture abdominal wall, measure a hand's breadth from the projection of the hip, and a hand's breadth from the last rib (the most prominent part of swelling is generally a sufficient guide for the operator), with the trocar and canula—the proper instrument for this purpose (the latter being left in the wound for some time in order to allow the gas to escape)—or, where these are not at hand, a butcher's carving or other large knife would serve the purpose, and the orifice being kept open for the passage of gas.

After abatement of acute symptoms, administer a strong purgative—Epsom salts, 16 oz.; powdered aloes, 8 dr.; powdered ginger $\frac{1}{2}$ oz.; mix well and give in a pint or more of warm water—to remove any irritant, and feed for several days on easily digestible food.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1902.		1903.										
	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.
<i>North.</i>													
Bowen ...	0.06	3.16	1.66	7.65	16.44	1.44	2.04	2.77	0.31	0.22	0.51	1.36	3.14
Cairns ...	1.38	5.15	21.32	10.28	32.51	15.50	1.67	0.51	0.87	0.44	0.47	0.91	3.10
Geraldton ...	0.14	5.53	38.94	17.24	45.00	14.03	7.44	3.42	2.07	7.08	3.79	3.05	7.13
Herberton ...	1.13	7.02	6.88	3.60	20.80	12.04	0.64	1.00	0.19	0.33	NIL.	0.67	6.21
Hughenden ...	0.22	2.77	1.52	0.99	0.95	0.81	1.73	NIL.	0.07	0.31	0.65	0.80	2.36
Kamerunga ...	1.57	3.79	20.36	10.82	37.45	19.32	2.14	0.50	1.10	1.50	0.86	1.39	4.94
Longreach ...	1.27	1.56	1.81	0.09	3.48	NIL.	3.51	NIL.	0.69	NIL.	1.58	0.90	0.83
Lucinda ...	0.10	2.47	17.43	11.66	44.24	6.44	6.38	2.44	2.38	4.39	0.30	0.76	10.67
Mackay ...	0.35	7.71	10.45	6.47	13.51	1.50	6.75	2.49	2.53	0.59	0.44	1.54	9.86
Rockhampton ...	0.51	5.60	0.92	1.68	3.73	1.12	6.93	0.08	3.73	0.68	0.54	1.84	7.42
Townsville ...	0.08	6.50	4.66	8.11	19.80	1.61	2.08	1.02	0.05	0.19	0.44	2.42	5.97
<i>South.</i>													
Barcaldine ...	0.85	6.41	3.73	0.40	0.94	NIL.	4.92	NIL.	0.90	0.50	4.23	1.01	4.00
Beenleigh ...	3.36	1.83	1.88	4.77	6.49	1.90	12.40	0.92	5.04	2.26	4.13	3.29	4.78
Biggenden ...	0.25	8.08	2.25	3.15	3.95	0.16	1.28	2.07	3.90	1.62	2.23	2.77	4.37
Blackall ...	1.05	4.61	3.04	1.50	3.87	NIL.	5.19	NIL.	1.81	0.75	2.25	0.45	2.56
Brisbane ...	2.69	1.82	1.31	5.35	4.79	1.33	11.82	0.73	5.56	3.84	4.73	3.63	3.98
Bundaberg ...	0.65	1.38	0.97	2.60	6.05	0.38	11.55	0.33	5.98	0.88	3.55	0.43	3.25
Caboolture ...	3.17	1.74	5.15	3.42	9.59	1.39	16.14	0.92	6.08	3.27	4.41	3.11	11.66
Charleville ...	2.14	4.79	1.70	0.43	2.94	1.06	2.94	0.02	1.61	0.62	3.40	0.95	2.20
Dalby ...	2.79	3.29	1.28	1.22	4.69	1.33	6.00	0.03	3.78	2.30	3.30	3.12	6.30
Emerald ...	1.58	8.42	2.30	2.49	1.48	0.26	3.43	0.02	0.67	0.24	1.23	1.90	2.21
Esk ...	4.00	7.67	1.32	3.51	4.46	1.25	9.27	0.30	2.97	4.21	4.86	3.69	4.02
Gatton College ...	3.72	5.14	3.68	3.81	2.60	0.79	7.55	0.17	4.15	2.50	3.56	4.71	5.05
Gayndah ...	2.08	3.37	0.77	2.08	2.30	0.09	6.03	0.05	2.81	1.06	2.62	4.37	3.03
Gindie ...	1.65	7.14	1.43	3.15	0.49	0.19	3.31	NIL.	0.51	0.30	1.58	1.97	4.06
Goondiwindi ...	0.89	2.21	1.84	0.72	4.40	1.73	5.07	0.15	4.38	2.09	4.22	2.16	3.73
Gympie ...	1.40	4.32	2.40	3.27	5.96	1.25	10.20	0.62	1.67	2.72	2.42	5.61	4.50
Ipswich ...	3.45	1.84	1.36	5.55	3.79	2.24	9.56	0.85	3.64	2.70	5.24	2.98	3.84
Laidley ...	3.27	5.13	0.71	3.63	2.63	0.95	8.20	0.20	4.65	3.06	4.25	5.47	3.87
Maryborough ...	1.11	4.02	2.09	2.76	3.23	0.66	9.68	1.60	6.17	1.09	1.93	2.62	3.96
Nambour ...	1.66	2.64	2.53	5.03	5.18	0.83	19.46	1.29	5.38	3.95	3.61	3.85	6.13
Neerang ...	1.75	1.73	3.36	4.73	4.84	3.04	15.75	2.36	7.34	2.21	3.81	3.52	3.86
Roma ...	0.86	2.35	0.75	0.15	2.48	0.39	3.17	0.34	2.26	1.13	6.61	1.92	3.16
Stanthorpe ...	3.98	1.75	0.23	1.59	0.95	1.18	6.87	0.74	4.71	1.98	6.07	3.45	4.45
Tambo ...	1.34	4.14	2.43	0.15	4.73	0.02	1.96	0.01	2.64	0.27	4.33	1.08	3.17
Taroom ...	1.40	2.88	4.32	1.53	1.29	0.82	8.63	0.23	3.83	2.21	1.51	2.05	3.76
Tewantin ...	1.96	1.35	1.90	5.30	11.52	1.80	20.22	7.42	7.09	5.70	5.80	2.85	9.85
Texas ...	1.67	1.42	0.18	0.94	0.48	1.84	4.34	0.36	4.53	3.21	1.55	2.47	4.93
Toowoomba ...	3.18	6.99	2.21	3.42	3.60	1.27	7.94	0.34	3.90	3.00	4.06	3.82	4.85
Warwick ...	2.87	4.61	0.68	2.59	2.13	0.73	8.62	0.10	5.45	2.63	3.41	2.89	3.92
Westbrook ...	3.34	3.37	4.21	2.70	1.52	0.34	4.23	2.53	3.89	1.63	3.89	4.03	5.11

EDGAR L. FOWLES,

For the Hydraulic Engineer.

PRICES IN BRITISH MARKETS OF ARTICLES WHICH CAN BE PRODUCED IN QUEENSLAND.

BUTTER.—Australian, 98s. to 108s.; Danish, 118s. to 122s.; New Zealand, 104s.; Canadian, 92s. to 104s. per cwt.

CHEESE.—Canadian, 52s. to 56s. per cwt.

CONDENSED MILK.—18s. 6d. to 20s. 6d. per case, in 20-case lots.

SUGAR (duties, raw, 2s. to 3s. 10d. per cwt.; refined, 4s. 2d. and $\frac{1}{2}$ per cent.).—Refined, £17 15s. to £18 5s.; raw, £15 to £16 per ton; German beet, 88 per cent., 8s. 4d. per cwt.

MOLASSES (duty, 2s. per cwt. and $\frac{1}{4}$ per cent.).—5s. 6d. to 8s. per cwt.

RICE (duty 5d. per lb.).—Rangoon, £9 10s. to £15; Japan, £14 to £17; Java, £20 to £26; Patna, £19 to £22 per ton.

COFFEE (in bond, duty $1\frac{1}{2}$ d. per lb. and $\frac{1}{4}$ per cent.).—Ceylon plantation, 90s. to 100s. to 120s.; peaberry, 60s. to 123s.; Santos, 28s. to 49s.; Mocha, 52s. to 100s.; Jamaica, 105s. to 130s. per cwt.

CHICORY Root, dried (duty paid, 13s. 3d. and $\frac{1}{4}$ per cent.).—24s. to 27s. per cwt.

ARROWROOT.—St. Vincent, $1\frac{3}{4}$ d. to $4\frac{1}{2}$ d.; Natal, 6d. to 8d.; Bermuda, 1s. 4d. to 1s. 8d. per lb.

WHEAT.—Duluth, 32s. to 33s. per 496 lb.; English, 27s. 6d. to 32s. per 504 lb.; Australian, 29s. per 480 lb.

FLOUR.—28s. to 31s. per 280 lb.

MALTING BARLEY.—27s. 6d. to 29s. per 448 lb.; grinding, 20s. 6d. to 21s. 6d. per 416 lb.

OATS.—New Zealand, 23s. to 25s. per 384 lb.

SPLIT PEAS.—39s. to 40s. per 504 lb.

GINGER.—Jamaica, 55s. to 65s.; Cochin, 68s. to 75s.; Japan, 26s. to 28s. per cwt.

VANILLA.—3s. to 7s. per lb.

PEPPER.—Capsicums, 18s. to 75s.; chillies, 52s. to 55s. per cwt.; black, 6d. to $6\frac{1}{2}$ d.; white, $9\frac{1}{2}$ d. to $9\frac{3}{4}$ d. per lb.

GREEN FRUIT.—Apples, Australian, no quotation; Tasmanian, no quotation; American, 18s. to 24s. per case; bananas, 10s. to 14s. per bunch; pineapples, 3s. to 6s. each; oranges, Italian, 12s. 6d. to 18s. 6d. per 420; lemons, Naples, finest, 26s. to 35s. per 420.

DATES.—Tafilat, no quotation; Persian, 8s. 9d. to 14s. 6d. per case; Egyptian, no quotation.

COTTON.—Uplands, 5d. to 6d. per lb.; West Indian Sea Island, 13d. to 15d. per lb.

COTTON SEED.—£6 5s. per ton.

COTTON-SEED OIL CAKE.—£6 10s. per ton.

COTTON-SEED OIL.—Crude, £19 per ton.

LINSEED.—36s. to 45s. per 416 lb.

LINSEED OIL CAKE.—£6 15s. to £7 per ton.

LINSEED OIL.—£15 to £15 5s. per ton.

OLIVE OIL.—£31 10s. to £33 per tun (252 gallons).

COPRA (cocoanut-kernel).—£15 to £16 per ton; £8 to £9 per ton at the S. S. Island trading stations. Corresponding value in Queensland, £10 to £12 per ton.

COCOANUT OIL.—£23 to £31 per ton.

LUCERNE SEED.—56s. to 65s. per cwt.

MANILLA HEMP.—£25 to £35 per ton.

NEW ZEALAND HEMP.—£32 per ton.

SISAL HEMP.—£35 per ton.

FLAX.—£48 to £52 per ton.

TAPIOCA (duty, 5d. per cwt.).—12s. 6d. to 13s. per cwt.

FROZEN MEAT.—The following are the Frozen Meat Trade Association's Smithfield market quotations for the undermentioned classes of frozen meat, based on actual sales of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef of fair average quality. These quotations are not for selected lines, but for parcels fairly representative of the bulk of the shipments now on the market:—

New Zealand Sheep.

(Crossbred Wethers and Maiden Ewes.)

	Dec. 19.	Dec. 21.
Canterbury, light (48 lb. to 56 lb.)	3 $\frac{1}{6}$ d.	4d.
Canterbury, medium (56 lb. to 64 lb.)	3 $\frac{1}{6}$ d.	4d.
Canterbury, heavy (64 lb. to 72 lb.)	3 $\frac{1}{6}$ d.	4d.
Dunedin and Southland (56 lb. to 64 lb.)	3 $\frac{5}{8}$ d.	3 $\frac{3}{4}$ d.
North Island (55 lb. to 65 lb.)	3 $\frac{1}{2}$ d.	3 $\frac{5}{8}$ d.

Australian Sheep.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	3d.	3 $\frac{1}{8}$ d.
Light (under 50 lb.)	3d.	3 $\frac{1}{8}$ d.

River Plate Sheep.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	3 $\frac{1}{8}$ d.	3 $\frac{1}{8}$ d.
Light (under 50 lb.)	3 $\frac{1}{8}$ d.	3 $\frac{1}{8}$ d.

New Zealand Lambs.

Canterbury, light (28 lb. to 36 lb.)	4 $\frac{3}{8}$ d.	4 $\frac{3}{8}$ d.
Canterbury, heavy (36 lb. to 42 lb.)	4 $\frac{5}{8}$ d.	4 $\frac{5}{8}$ d.
Dunedin and Southland (28 lb. to 42 lb.)	4 $\frac{3}{8}$ d.	4 $\frac{3}{8}$ d.
North Island (28 lb. to 42 lb.)	4 $\frac{1}{2}$ d.	4 $\frac{1}{2}$ d.

Australian Lambs.

30 lb. to 40 lb.	4 $\frac{3}{8}$ d.	4 $\frac{3}{8}$ d.
------------------	--------------------	--------------------

River Plate Lambs.

30 lb. to 40 lb.	None offering.
------------------	----------------

New Zealand Frozen Beef.

Ox, fores (180 lb. to 220 lb.)	2 $\frac{1}{2}$ d.	2 $\frac{1}{2}$ d.
Ox, hinds (180 lb. to 220 lb.)	3 $\frac{1}{2}$ d.	3 $\frac{9}{16}$ d.

Australian Frozen Beef.

Ox, fores (160 lb. to 200 lb.)	2 $\frac{3}{8}$ d.	2 $\frac{3}{8}$ d.
Ox, hinds (160 lb. to 220 lb.)	2 $\frac{3}{4}$ d.	2 $\frac{3}{4}$ d.

River Plate Frozen Beef.

Ox, fores (160 lb. to 220 lb.)	2 $\frac{3}{8}$ d.	2 $\frac{3}{8}$ d.
Ox, hinds (160 lb. to 220 lb.)	2 $\frac{7}{8}$ d.	2 $\frac{7}{8}$ d.

(All quotations for beef are nominal.)

EGGS.—French, 13s. to 15s.; Danish, 12s. 6d. to 14s. per 120.

BACON.—Irish, 56s. to 62s.; American, 56s. to 58s. per cwt.

HAMS.—Irish, 74s. to 94s.; American, 54s. to 60s. per cwt.

TALLOW.—Mutton, fine, 28s. 9d.; medium, 26s. 6d. per cwt.; beef, fine, 28s. 6d.; medium, 26s. 3d. per cwt.

General Notes.

GRAPE JUICE.

The juice of the grape is invariably considered in the light of wine-making. Comparatively few people are aware that the expressed juice of the grape may be preserved without any fermentation, and utilised in the concoction of many pleasant non-intoxicating summer drinks. We know that European doctors very often send their patients to grape-growing districts to undergo what is known as "The Grape Cure" for many ailments. The grape cure simply means a pleasant process of assimilating the juice of the grape by eating as much as possible during the vintage. The cure, however, is restricted to the vintage season, and many patients are not strong enough to travel any long distance to the vineyards. Hence, it is satisfactory to know that the science of the present day has shown how the cure can be prolonged long after the grape season is over by preserving the grape juice in bottles.

The Agricultural Department of Canada has issued a very useful pamphlet dealing with the subject of unfermented grape juice, and showing how it may be preserved and used in many ways as a pleasant drink.

First of all, it is laid down that only sound, well-ripened grapes are to be used.

The grapes may be crushed and pressed with the hands. If a light-coloured juice is desired, put the crushed grapes in a cleanly washed cloth sack, and tie up. Then either hang up securely, and twist it or let two persons take hold, one on each side of the sack, and twist it until the greatest part of the juice is expressed. Then gradually heat the juice in a double boiler or a large stone jar in a pan of hot water, so that the juice does not come in direct contact with the fire, at a temperature of 180 to 200 degrees, never above 200.

It is best to use a thermometer at this stage, but if none is available heat the juice until it steams, but do not permit it to boil. Put it in a glass or enamel vessel to settle for twenty-four hours; carefully drain the juice from the sediment, and run it through several thicknesses of clean flannel, or a conic filter made from woollen cloth or felt may be used. After this, fill into clean bottles.

Do not fill entirely, but leave room for the liquid to expand when again heated. Fit a thin board over the bottom of an ordinary wash boiler, set the filled bottles in it, fill in with water to within about an inch of the tops, and gradually heat it until it is about to simmer. Then take the bottles out and cork and seal immediately.

According to this pamphlet, grape juice is a wholesome, refreshing, and delicious beverage, and one which may be used in a great many ways. For invalids two teaspoonfuls of grape juice should be put in a glass, to which add the beaten white of an egg and a little chopped ice. Sprinkle powdered sugar over the top. The drink is popular in certain sanatoriums.

Grape Sherbet.—For eight persons mix 1 pint of unfermented grape juice, juice of 1 lemon, and 1 heaping tablespoonful of gelatine, dissolved in boiling water; freeze quickly, adding the beaten white of an egg just before the freezing is complete.

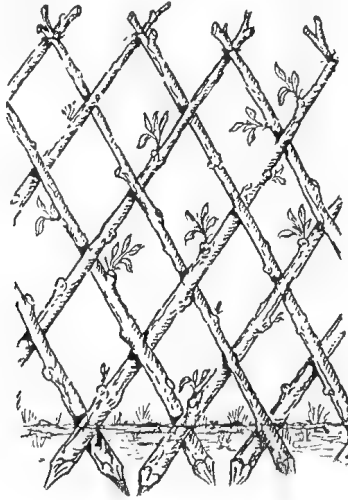
Grape Punch.—Boil together 1 lb. of sugar and half a pint of water until it spins a thread. When cool, add the juice of 6 lemons and 1 quart of grape juice. Stand aside over night. Serve with plain or carbonated water.

Bohemian Cream.—One pint of thick cream, and 1 pint of grape juice jelly. Stir together, put in cups, and set on ice. Serve with lady-finger biscuits.

NOTES FROM THE DAINTREE.

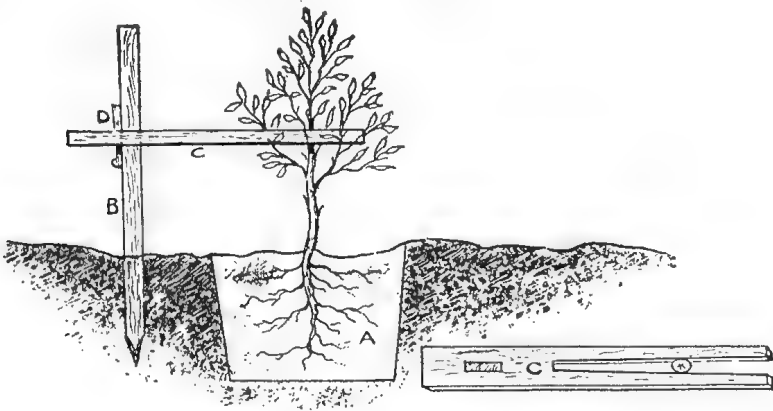
A LIVE FENCE.

From Mr. J. T. Pentzcke, Daintree River, we learn that the young saplings of the Herbert River cherry-tree (*Antidesma Dallachyanum*), so



common in all the Northern scrubs, are very suitable for making fences, which quickly form a living hedge. The green saplings are pointed and driven into the ground, as shown in the illustration, and, if the ground is moist, they soon sprout and form an excellent live hedge.

Mr. Pentzcke also sends us the accompanying illustration of



A DEVICE FOR PLANTING TREES.

The hole (*a*) having been prepared, the stake (*b*) is driven into the ground near it. The stem of the young tree slips into the groove in the horizontal piece (*c*), which is keyed on to the perpendicular stake, and which can be raised or lowered, if necessary, to suit the height of the tree. He claims for the apparatus that it saves one hand, and leaves the gardener free to spread out the rootlets and fill in the hole with prepared soil.

A SUGAR-MILL FOR THE DAINTREE.

From the same source we learn that a movement is on foot amongst the resident landholders to obtain a sugar-mill for the district, but this can only eventuate if the absentee landholders join in the venture, when it is expected that the mill will be the largest concern of its kind in Australia. It appears, however, that there are

only twelve resident farmers in the district, and that all the large blocks of land are held by absentees. Such being the case, we do not see much chance of any mill, large or small, being erected on the Daintree in the near future. The land is wonderfully fertile, and eminently adapted to cane cultivation by small farmers. But, until the big blocks are cut up and settled on, there is not much prospect of the district progressing so rapidly as to warrant the erection of an expensive up-to-date sugar-mill. The land, from which large quantities of cedar were taken, is said to be overgrown with lawyer-vines, and clearings made by the Chinese banana-growers are now so overgrown that only an expert could tell where they had been made. The floods, which occur about every five years, have raised the level of the land over a foot, and the river frontages are all covered at high tide for nearly 20 miles. Mr. Pentzke is of opinion that the climate is quite suitable for the white man to work in, and considers that a temperature of 100 degrees in the sun on the Daintree is less distressing to field hands than 86 degrees in South Australia or during hot winds in the mallee country of Victoria. There are many Northern men, however, who dispute this, on the ground that the dense, moist heat of the Far North is far more distressing to outdoor workers than the dry heat of the South.

MUSTARD PICKLE.

Cut into small pieces 2 quarts of green tomatoes, 12 large cucumbers, 1 quart of string beans, 2 large cauliflowers, add 24 small cucumbers, and 36 button onions. Wash them, place them in a kettle, sprinkle 1 pint of salt over them, place a plate on them, supporting a weight (a flat iron will answer), and let stand over night. Drain, return to the kettle, add weak vinegar to cover, and boil gently for one half-hour. Have boiling in another kettle 3 quarts of cider vinegar, 1 lb. of brown sugar, 1 oz. each of turmeric and celery salt, 4 oz. of white mustard seed, 1 small box of mustard, and 3 tablespoonsful of white pepper. Drain the pickle in a sieve. Put 2 quarts of it into the dressing, let it boil, and then remove with a ladle; continue until all is cooked. Pack in glass jars, and fill them up with the boiling-hot dressing. Seal carefully.

ROSELLA CUTTINGS.

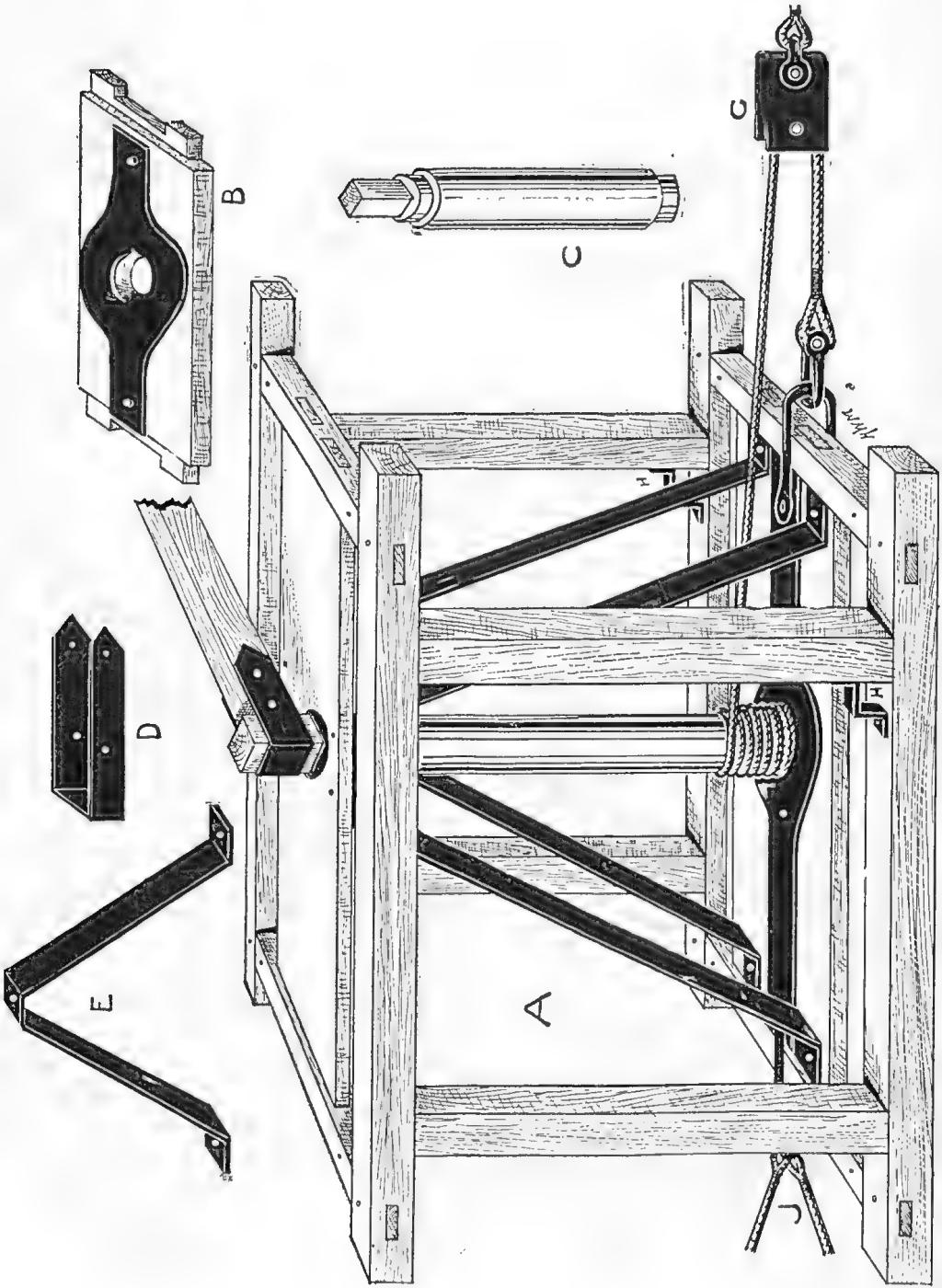
Referring to a paragraph on this subject which appeared in the September issue of the *Journal*, Mr. R. Lipsett, Fairview, Miva, says that he has successfully adopted a different method. He takes the lower branches and presses them into the soil without separating them from the main stem. These strike root in a short time. After a few days the connection is severed, and the new plants are removed to be planted wherever desired. No harm is done to the parent plant by the loss of a few of the lower branches. He adds that cucumber vines may be had in abundance from one vine, by simply taking cuttings as is done in the case of sweet potatoes. In each case, a plentiful supply of water is necessary.

PYRETHRUM, OR PERSIAN INSECT POWDER.

There is no more valuable insecticide than Persian insect powder. It is thoroughly effective with horse flies, moths, bed bugs, currant worms, and cabbage worms—all insects without lungs. It will also destroy a large percentage of the slugs of the Colorado beetle; and, where people are afraid to treat these pests with Paris green after the tubers begin forming, it will pay for its use; but it can't be depended upon to kill the "hard shells" in any appreciable number. For use upon potatoes, put 1 teaspoonful in 1 gallon of water, and apply with a fine sprinkler. To exterminate the house fly, I prepare the room so that it will be an easy matter to collect the dead flies

$$A_1 = 0$$

Plate VI.



STUMP-PULLING MACHINE.

from the furniture and floor. Then close all doors and windows, and proceed to fill the atmosphere with the powder, using a small bellows for the purpose. Then I retire from the scene for about twenty minutes, when I return with a broom and dustpan, being careful to close the door as quickly as possible. The next move is to brush off all the flies from the furniture and floor, stirring the air as little as possible. Gather up dead and all; burn immediately. If the stupefied insects are allowed fresh air they will revive, and the labour be lost. If these directions are carefully followed, scarcely a fly will be left in the room.—*Epitomist*.

AN EFFECTIVE STUMPING MACHINE.

Much interest was shown by farmers and others in a simple gear for extracting stumps, devised by Mr. W. E. Thomas, of Diddililah, which we illustrated and briefly described in our issue of 1st January, 1903. At that time we had seen the device at work at Petrie's Creek, Maroochy, and noted its simplicity, and the ease with which two large green stumps were extracted at once. Since then, Mr. Thomas has improved the machine, and has forwarded us the plan here reproduced. The price of the machine was originally from £10 to £12. Mr. Thomas has not mentioned any price for the improved gear, but probably there will be no considerable increase. A few details are needed in describing the construction of the machine and the application of the power.

The framework is made of silky oak; or of any similar light, tough woods, and the windlass barrel and lever of nut-wood, usually known as crow's ash. A $\frac{5}{8}$ -inch wire rope is sufficient for winding on the barrel, and a 1-inch for the leading rope. A strong block may be cheaply made from a piece of old 6-inch by $\frac{1}{2}$ -inch iron wagon-tyre, doubled back and welded. Two holes are drilled in it, one for the pin of the sheave, the other for the shackle. If care is used in doubling back the iron, these holes may be punched out before welding. To make double or treble blocks, it is only necessary to make them wider, and to insert thin sheet-iron plates between the sheaves. The same kind of block is used for a snatch or leading-block, when pulling stumps near the machine, or, when tree-pulling, to keep the falling tree away from the machine, as it was found that to get a snatch-block strong enough to stand the strain, it has to be very heavy, and too cumbersome for convenience of handling. The sheaves must be very solid to stand the heavy strain. The anchor sling is kept as low on the anchor stump as possible, to prevent canting, and it will be found that if a piece of 3-inch by 3-inch hardwood, or a sapling, be run through brackets, called a balancer, and allowed to project three or four feet on either side of the machine, it will greatly help in this respect. The eyes for the wire rope require to be very heavy, and have a side measurement of 6 inches by 4 inches, with $1\frac{1}{2}$ inches of tread. Much greater power may be developed by using a single or double block or a double and treble block, instead of bolting to the shackle and using single blocks as shown in the plan.

REFERENCE TO DIAGRAM.

Scale, 2 inches to 1 foot.

Parts, 1 inch to 1 foot.

Ironwork and wire rope, coloured black.

A, complete machine; B, bottom slab, top side showing straight plate of 4-inch by $\frac{1}{2}$ -inch iron; hole in plate, $5\frac{1}{2}$ inches in diameter; C, barrel or roller.

D, lever iron; E, diagonal stay.

G, side view of single block; H, I, balancer brackets.

J, anchor stump slings.

The framework is strengthened by $\frac{1}{4}$ -inch bolts at the junction of the timbers.

BANANA SUGAR.

Banana sugar is evidently a possibility. It is described in the *Sugar Planters' Journal* as possessing a distinct flavour, and is said to be pleasant and palatable. So far, difficulty has been experienced in making the sugar perfectly dry, but the producers hope in time to overcome this drawback.

POULTRY IN THE UNITED STATES.

The poultry business of the United States is becoming one among the principal industries. It now amounts to about 500,000,000 dollars a year, equal to £100,000,000 sterling, and is increasing with phenomenal rapidity. Firms with millions of capital are investing in the buying and selling of poultry, and encouraging farmers in every way to produce more poultry and eggs. While prices are not as high as those quoted in Australian papers, they are high enough to make poultry very profitable. Several of the States have regular courses in poultry culture provided for in their agricultural colleges, and two schools devoted to poultry culture alone are in operation, and have a large number of students.

HARVESTING WHEAT ON SUNDAYS.

Owing to the urgent necessity for getting off the wheat crops, and the uncertainty of the weather, many farmers worked on Sundays as well as week days. To some good people this did not seem right, although saving the crop may undoubtedly be classed as a work of necessity, as much as dragging a beast out of a pit on the Sabbath day to save its life.

A Cumberland vicar the other Sunday morning preached a notable sermon, which occupied but three sentences. Taking his text: "Wherefore it is lawful to do well on the Sabbath day," the Rev. H. M. Kennedy, of Plumpton, said: "The plea is thrice recorded. There is no pit in Plumpton for life destruction, but the staff of life is this year partly housed, partly lost, and part to-day in danger. Go and rescue this last for yourselves and your neighbours." Harvesting was general in the parish that day.

CURE FOR SNAKEBITE.—GULF STATION INCIDENT.

Mr. T. G. Blakeney, manager of Riversleigh Station, sends us the following, which may prove interesting and instructive to our bush readers generally:—

One of the blackboys here was bitten by a snake a few nights ago. They don't know what the snake was like, as the boy kicked him off his leg, and he got away without being seen, but, according to the track, the reptile was about 4 or 5 feet long, and probably a whip-snake. Mr. Mellor was on the spot almost immediately, and applied ligatures without delay. The boy was in great pain, and scarifying brought very little blood. I happened to be looking over the *Queensland Agricultural Journal* a few days before, in which I saw that vinegar had been used successfully in cases of snakebite in India; so I brought a bottle out with me, and we took it in turns to rub. The bite was on the root of the little toe, and in 15 minutes the pain had extended to the boy's thigh. Shortly after the vinegar was applied the knife wounds began to bleed freely, and in half an hour after the application all pain had ceased. We rubbed the vinegar in for about an hour and a half. The foot swelled considerably, and even now, after three days, is still swollen. The publication of this fact through the medium of your widely-read paper may do much good.—*Croydon Record*.

The following is the article from the *Agricultural Journal* referred to by Mr. Blakeney:—

A correspondent at Mooloolah sends us a cutting from the Allahabad (India) *Pioneer*, from which we make extracts, as we think that any possible cure for snakebite should be made known to all.

A lady at Madras says that her husband was stung by a bee, and instantly allayed the pain by rubbing the wound with malt vinegar. This gave him an idea. He went to a syce (groom), and asked him to get him a scorpion, as he wished to find a cure for their sting. He also offered a rupee to any syce who would allow himself to be stung, knowing that a man would not die from a scorpion sting. In the evening the man and the scorpion were brought to him. The scorpion, a large black one, stung the man on the middle finger, and the pain soon went to the elbow, the man writhing in pain. A ligature was tied above the wound, and vinegar rubbed in. In twenty minutes all pain had ceased.

The experimenter then thought he would try the vinegar for a snakebite, and one day a large cobra was brought to him. As no dog was available as a victim, a fowl was experimented on. The leg of the bird was bared of feathers. Then it was tied to a bamboo and placed near the snake, which bit the poor bird savagely. For three and a half hours vinegar was rubbed in. The wound first became scarlet, then green, and finally the whole leg was black. The fowl recovered.

Soon afterwards a dog was bitten by a cobra in two places. The wound was at once scarified, and vinegar rubbed in for over three hours. Then the leg underwent the same changes as in the case of the fowl, and the dog recovered. To prove that the snake's venom was present, some Brahmins asked that another dog might be bitten by it. This was done, but no vinegar was rubbed in, and the dog died in three-quarters of an hour. Directly afterwards it bit a dog on the tongue, and also bit a fowl. Both died in half an hour. A dog when bitten three times was treated, and lived.

A woman in Trinchinopoly was bitten by a snake on the back of the hand while gathering firewood. The hand was much swollen. Brandy and vinegar were rubbed in, and the woman recovered.

Our correspondent says that there is no statement that vinegar is an infallible cure. The facts, however, are there. It would be well if anyone bitten by a snake in the bush in this State would try the remedy, and, if it proved successful, would publish the fact far and wide.

From Mr. Blakeney's statement it would appear that the vinegar cure for snakebite is all that was claimed for it by the Allahabad *Pioneer's* correspondent. We are only too glad to believe that the article in this *Journal* was the means of saving a life, and trust that the results of the application of vinegar will be noted far and wide over the State.

JUDGING AT SHOWS BY OFFICERS OF THE DEPARTMENT OF AGRICULTURE.

In consequence of the reduction of the staff of the Department, agricultural and other societies are requested to note that in future no officer of the Department will be permitted to officiate as a judge at any show within the State.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

SEAVIEW ORCHARD, MAPLETON.

In our description of the orchard at Mapleton in the December issue of the *Journal*, we stated that the yield from five-year-old orange-trees in that district is eight cases per tree. This is an obvious misprint, and should have read three cases per tree. Old growers of oranges would, of course, at once set the statement down as an uncorrected printer's error, knowing that it is impossible to get a return of eight cases from a five-year-old tree. The mistake has been pointed out to us by Mr. W. J. Smith, owner of the Seaview Orchard, and we hasten to correct it in the interests of new beginners.

THE TRAINING OF FOREST OFFICERS.

By an oversight the letter on this subject, which we publish on page 46, is stated to have been written by Mr. Thurns. The writer was Sir W. T. Thistleton-Dyer, Director of Kew Gardens.

Times of Sunrise and Sunset, 1904.

DATE.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		PHASES OF THE MOON.
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	
1	4:57	6:45	5:21	6:42	5:42	6:19	5:58	5:46	3 Jan. ○ Full Moon 3 47 p.m.
2	4:58	6:46	5:22	6:42	5:42	6:18	5:59	5:45	10 „ ☾ Last Quarter 7 10 a.m.
3	4:58	6:46	5:22	6:42	5:43	6:17	6:0	5:44	18 „ ● New Moon 1 46 „
4	4:59	6:46	5:23	6:41	5:44	6:16	6:0	5:43	26 „ ☽ First Quarter 6 41 „
5	5:0	6:46	5:24	6:40	5:44	6:15	6:0	5:42	
6	5:0	6:46	5:24	6:40	5:44	6:14	6:1	5:40	
7	5:1	6:47	5:25	6:39	5:45	6:13	6:1	5:39	2 Feb. ○ Full Moon 2 33 a.m.
8	5:2	6:47	5:26	6:38	5:45	6:12	6:1	5:38	8 „ ☾ Last Quarter 7 56 p.m.
9	5:3	6:47	5:27	6:37	5:46	6:11	6:2	5:37	16 „ ● New Moon 9 4 „
10	5:3	6:47	5:28	6:36	5:47	6:10	6:2	5:36	24 „ ☽ First Quarter 9 8 „
11	5:4	6:47	5:29	6:35	5:47	6:9	6:3	5:35	
12	5:4	6:48	5:29	6:35	5:48	6:8	6:4	5:34	
13	5:5	6:47	5:30	6:34	5:49	6:7	6:4	5:33	2 Mar. ○ Full Moon 0 48 p.m.
14	5:6	6:47	5:30	6:34	5:50	6:6	6:5	5:32	9 „ ☾ Last Quarter 11 0 „
15	5:7	6:47	5:31	6:33	5:50	6:4	6:5	5:31	17 „ ● New Moon 3 39 „
16	5:8	6:47	5:32	6:32	5:51	6:3	6:6	5:30	25 „ ☽ First Quarter 7 36 a.m.
17	5:9	6:46	5:32	6:32	5:51	6:2	6:7	5:29	31 „ ○ Full Moon 10 44 p.m.
18	5:10	6:46	5:33	6:31	5:51	6:1	6:7	5:28	
19	5:11	6:46	5:34	6:30	5:52	6:0	6:7	5:27	8 April ☾ Last Quarter 3 53 a.m.
20	5:11	6:46	5:35	6:29	5:52	5:59	6:8	5:26	16 „ ● New Moon 7 53 „
21	5:12	6:46	5:35	6:28	5:52	5:58	6:9	5:25	23 „ ☽ First Quarter 2 54 p.m.
22	5:12	6:46	5:36	6:27	5:53	5:57	6:9	5:24	30 „ ○ Full Moon 8 36 a.m.
23	5:13	6:46	5:37	6:26	5:54	5:56	6:10	5:23	
24	5:14	6:45	5:38	6:25	5:54	5:55	6:10	5:22	
25	5:15	6:45	5:39	6:24	5:55	5:54	6:11	5:21	
26	5:16	6:44	5:40	6:23	5:55	5:53	6:11	5:21	
27	5:17	6:44	5:40	6:22	5:55	5:52	6:12	5:20	
28	5:18	6:44	5:41	6:21	5:56	5:50	6:12	5:19	
29	5:19	6:43	5:41	6:20	5:57	5:49	6:13	5:18	
30	5:19	6:43	...	...	5:57	5:48	6:13	5:17	
31	5:20	6:42	...	...	5:58	5:47	...	...

The approximate times for sunrise and sunset at Rockhampton, Townsville, and Cooktown may be obtained by using the table for Brisbane, and adding the following figures:—

	ROCKHAMPTON.		TOWNSVILLE.		COOKTOWN.	
	Rise.	Set.	Rise.	Set.	Rise.	Set.
1904.						
January	...	18 m.	2 m.	42 m.	12 m.	53 m.
February	...	15 m.	5 m.	36 m.	18 m.	44 m.
March 1 to 20	...	11 m.	9 m.	29 m.	25 m.	35 m.
„ 21 to 31	...	9 m.	11 m.	28 m.	26 m.	29 m.
April	...	7 m.	13 m.	20 m.	34 m.	21 m.

Answers to Correspondents.

SORE TEATS.

J. VARLEY, Rosewood.—Many remedies have been given for sore teats. The best remedy appears to be boric acid. Being an anti-irritant and anti-septic, it serves sanitary purposes for washing the teats and the milker's hands. Used in a diluted form, it will be found most serviceable.

PERCENTAGE OF BUTTER-FAT FOR FACTORY PURPOSES.

A.M.J., Greenbank, Logan—

Question.—If 2 lb. of cream give a return of $1\frac{1}{2}$ lb. butter, what would be its percentage of butter-fat for factory purposes?

Answer.—Assuming that the finished article did not contain an undue amount of foreign matter, it should be about 60 per cent. Cream with such a high butter-fat content is much too rich for ordinary commercial purposes, and, for various reasons, is unprofitable to suppliers. Factory managers prefer a cream testing about 40 per cent. of butter-fat, 2 lb. of which, allowing for the difference between a *measured* and a *weighed* sample, are generally estimated to produce 1 lb. of commercial butter.

You will find it to your advantage to adjust your separator so that it will skim a cream testing between 36 per cent. and 40 per cent. butter-fat. It may be added that keeping back a portion of the cream and making butter from it, under the primitive conditions prevailing at the average dairy farm, as compared with that from a factory, where the facilities for turning out a good article are so much in favour of the latter, as a check upon the factory, is by no means an infallible test. In the first place, a representative sample may not have been taken; and, secondly, the butter may contain an abnormal amount of moisture, caseine, &c.

MAIZE IN THE SILO—GREWIA POLYGAMA.

P. MOLLOY, Rocky Plains, Cairns-Atherton Railway—

1. Professor F. W. Woll, Assistant Professor of Agricultural Chemistry at the University of Wisconsin, U.S.A., writing on silos, silage, and silage crops, says, in reference to pit silos:—

“This rather crude method of preserving fodder will, however, always be accompanied by large losses, on account of the excessive and faulty fermentation occurring during the siloing period. It, therefore, cannot be recommended. . . . Maize should be allowed to pass through the dough stage before cutting, *i.e.*, when the kernels are well dented or glazed, in case of flint varieties. If the stalks are rather dry, water applied directly to the fodder in the silo, acts in the same way as water in the fodder, and keeps the fermentation in the silo in the right track.”

Your pits, being square, have probably not been properly filled. In filling-in chaffed maize stalks, the fodder should be evenly distributed, and trampled well into the corners especially. Unless the fodder settles evenly, the feeding value of different layers will differ greatly.

GREWIA POLYGAMA.

2. The leaves you send have been identified by Mr. F. M. Bailey, Colonial Botanist, as *Grewia polygama*. Mr. Bailey also gives the native

names, as far as known to him, which may help bushmen to recognise the plant. These are:—

Kooline—Cloncurry District.

Karoom—Rockhampton.

Ouraie—Cleveland.

Pam-mo—Cooktown.

Kon-nung—Morehead River.

The shrub is widely spread over Queensland and some other warm countries, where the fruit is eaten and twine made from its bark. It is mentioned by Dr. Leichhardt in his report of his overland expedition to Port Essington, in which he says:—"I found a great quantity of ripe *Grewia* fruits, and, on eating many of them, it struck me that their slightly acidulated taste, if imparted to water, would make a very good drink. I therefore gathered as many as I could, and boiled them for about an hour. The beverage which they produced was the best we had tasted on our expedition."

Captain Armit, during his expedition to Bellenden-Ker, found the plant eminently useful in case of dysentery and of what you describe as "gripes." You can confidently recommend it to any one suffering from such complaints, and we are also very pleased that you have taken the trouble to bring the beneficent properties of the *Grewia* before the public.

Mr. F. M. Bailey says that in India the bark of another species of the genus—viz., *G. tiliaefolia*—is rubbed down with water and the thick mucilage strained from it, and is then given as a remedy for dysentery.

YIELD OF BUTTER, MILK, AND CHEESE PER COW.

DAIRYMAN, Alberton.—Much depends upon the plenty or scarcity of feed, the quality of it, and still more upon the class of cow. Hoard says that a good cow should not produce less than 250 lb. butter, or 500 lb. cheese. Other authorities take as the standard of production 6,000 lb. of milk, or 260 lb. of butter, or 600 lb. of cheese. In crack dairies, a cow which does not produce 250 lb. butter per year is not considered profitable enough to be permanently retained.

Mr. J. Mahon, Principal of the Queensland Agricultural College, always expects a cow to yield 200 lb. butter or 500 lb. cheese, reckoning that it requires an average of $2\frac{1}{2}$ gallons of milk to make 1 lb. butter and 1 gallon milk to make 1 lb. of cheese.

EGG-BOUND HENS—MEDICINAL PROPERTIES OF KEROSENE— PARROT MOUTH—MULE BREEDING.

FARMER, Kerry, Beaudesert—

The difficulty arises, in some cases, from the abnormal size of the egg, and is generally associated with an inflamed state of the oviduct, but, more often, it is an egg with no shell. The latter are much harder to pass than a hard-shelled egg; and the hen, in straining, bursts the egg. The contents then run away, whilst the skin is left inside the oviduct. This should be gently removed by the finger, as it is only just inside the oviduct. If this is not done, the hen is almost sure to rupture herself by continually straining, and a part of the oviduct comes right outside. It is always well to dip a feather in salad oil and pass it up the egg-passage, or inject an ounce of warm salad oil. Occasionally, a large egg will get crossways, and the hen cannot pass it; a hen often dies, and the cause is set down as egg-bound, when it is really a case of broken eggs in the oviduct. Apply fomentations of hot water; give a tablespoonful of warm molasses. When the egg or its remnants have been removed, administer an aperient. Give 20 grains of sulphate of magnesia every six hours. If the hen is very fat, feed sparingly.

Your question on Guinea fowls will be answered in our next number.

MEDICINAL PROPERTIES OF KEROSENE.

Mr. W. C. Quinnell, M.R.C.V.S., Lon., says that, on reference to Pharmacopœas (veterinary and human), there is only a single instance given of its use as a medicinal agent—namely, for the destruction of skin parasites, and, even for this purpose, its general application is not recommended. Again, kerosene, according to its manufacture, varies in its composition, and often contains impurities.

PARROT MOUTH.

Where the mouth is closed, the upper row of incisor (nippers) teeth projects, thus overhanging the lower teeth. Parrot mouth, which is a congenital malformation, is, therefore, not amenable to surgical interference. It will be obvious that a horse having its teeth thus arranged is placed at a great disadvantage with regard to grazing.

MULE BREEDING.

To breed strong, useful mules, the donkey sire should be mated with stout, roomy mares; bearing in mind that mules are not bred for speed, but for strength and endurance. Speaking generally, mares of good bone substance, and roomy, should be selected for mule breeding, such as are described as light harness mares.

Mr. J. A. Macartney, pastoral inspector for the Queensland Investment and Land Mortgage Company, had very recently some donkey stallions for sale.

COTTON GINS.

COTTON, Harrisville.—The roller gin is in almost universal use in the Sea Island cotton district, from South Carolina to Florida. The gin most favoured there is the Pratt roller gin. The McCarthy roller gin is almost exclusively used in Egypt. Saw gins are manufactured by the Eagle Cotton Gin Company Bridgewater, Massachusetts, also at the Texas Gin and Machine Works, Dallas, Texas. There are also makers of gins in Tennessee, Alabama, and Georgia, in the United States of America. The Bailey-Lebby Company, of Charleston, South Carolina, also make a small hand-gin, known as the Mann IXL. It is a roller gin, and works satisfactorily on a small scale. If cotton is again generally planted in Queensland, you will have no difficulty in procuring all the needful machinery in Queensland.

USE OF PARIS GREEN.

FARMER, Toowoomba.—Use Blundell's Paris Green. After the lapse of three weeks, there is no danger either from circulation or from its remaining on the surface.

The Markets.

AVERAGE PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	DECEMBER.	
	Top Prices.	
Apples, Eating, per case	8s.	
Apples, Cooking „	12s.	
Apples, American, Eating, per case	21s.	
Apples, American, Green „	14s. 6d.	
Lemons, Italian, per 150 to 180	9s. to 10s.	
Lemons, Italian, per 150 to 180	10s. 6d.	
Lemons, American, per 180	11s. 6d.	
Lemons, New South Wales, per case	6s.	
Oranges, Italian, per 180	12s.	
Oranges, Local, per case	10s.	
Oranges, Sydney (packers), per case	12s.	
Mandarins, Local (indifferent) ... ..	...
Mandarins, Sydney (packers) ... ..	...
Apricots, New South Wales, boxes (half-gincase)	8s.	
Apricots, Queensland, half-case	5s.	
Plums, half-gincase	6s.	
Peaches, half-gincase	4s. 6d.	
Nectarines, half-gincase	4s. 6d.	
Gooseberries, English, per quarter-case	4s.	
Cherries, per quarter-case	9s.	
Passion Fruit, quarter-case	4s.	
Mangoes, per case	6s.	
Pineapples, rough, per dozen	3s. 8d.	
Pineapples, Queen „	6s. 3d.	
Melons, per dozen	8s. 6d.	
Rockmelons „	4s. 3d.	
Bananas, per bunch	1s. 6d.	
Bananas, per dozen	2½d.	
Tomatoes, quarter-case	1s. 6d.	
Papaw Apples, quarter-case	1s. 6d.	
Custard Apples, quarter-case ... ..	...
Granadillas, case ... ..	...
Seville Oranges, apple-case ... ..	...
Cape Gooseberries, per quart	3½d.	
Pears (Melbourne), export case ... ..	...
Pears (Tasmanian), quarter-case ... ..	...
Pears (China), Local, per case	2s.	
Rosellas, per sugar-bag ... ..	...

AVERAGE TOP PRICES FOR DECEMBER.

Article.	DECEMBER.	
	Top Prices.	
Bacon (Pineapple)	lb.	7½d. to 8½d.
Barley (Malting)... ..	bush.	2s. to 3s. 3d.
Bran	ton	£2 to £2 15s.
Butter, Factory	lb.	8d. to 9½d.
Chaff, Mixed	ton	£1 10s. to £3 1s. 8d.

AVERAGE TOP PRICES FOR DECEMBER—continued.

Article.						DECEMBER.
						Top Prices.
Chaff, Oaten	...	...	...	...	ton	£3 15s. to £4.
Chaff, Lucerne	...	...	...	...	"	£1 10s. to £2 5s.
Chaff, Wheaten	...	...	...	...	"	£2 10s.
Cheese	...	...	...	...	lb.	6½d. to 7½d.
Flour	...	...	...	...	ton	£7 10s. to £12.
Hay, Oaten, Hydraulic	...	...	...	...	"	£5 to £5 7s. 6d.
Hay, Lucerne	...	...	...	...	"	15s. to £1 8s. 4d.
Honey	...	...	...	...	lb.	1¾d. to 2d.
Maize	...	...	...	...	bush.	2s. 11d. to 3s. 2½d.
Oats	...	...	...	...	"	2s. 9d.
Pollard	...	...	...	...	ton	£4 10s. to £4 15s.
Potatoes	...	...	...	...	"	£2 10s. to £3 5s.
Potatoes, Sweet	...	...	...	...	"	£1 to £1 16s. 8d.
Pumpkins	...	...	...	...	cwt.	9d. to 3s. 3d.
Wheat, Milling	...	...	...	...	bush.	3s. to 3s. 6d.
Wheat, Chick	...	...	...	...	"	2s. 6d. to 4s. 3d.
Onions	...	...	...	...	ton	£1 to £5.
Hams	...	...	...	...	lb.	1s. to 1s. 1d.
Eggs	...	...	...	...	doz.	8d. to 11¼d.
Fowls	...	...	...	...	pair	1s. 10d. to 4s. 8d.
Ducks, English	...	...	...	...	"	3s. to 4s. 6d.
Ducks, Muscovy	...	...	...	...	"	3s. to 5s. 6d.
Geese	...	...	...	...	"	6s. to 8s. 6d.
Turkeys, Hens	...	...	...	...	"	6s. to 8s. 3d.
Turkeys, Gobblers	...	...	...	...	"	12s. 6d. to 18s. 9d.

ENOGGERA SALES.

Article.										NOVEMBER.		
										Top Prices.		
Bullocks	...	...	...	...	...	...	...	...	...	£	s.	d.
Cows	...	...	...	...	...	...	...	...	...	10	18	1½
Wethers, Merino	...	...	...	...	...	...	...	...	...	8	13	9
Ewes, Merino	...	...	...	...	...	...	...	...	...	1	2	3¾
Wethers, C.B.	...	...	...	...	...	...	...	...	...	1	0	7½
Ewes, C.B.	...	...	...	...	...	...	...	...	...	...	...	...
Lambs	...	...	...	...	...	...	...	...	...	0	16	5¼

Orchard Notes for January.

By ALBERT H. BENSON.

In bearing deciduous orchards, the chief work of the month will be the gathering and marketing of the fruit. This work requires to be carried out in a much better and more systematic manner than is usually the case, as a great deal of our fruit is badly handled, badly graded and packed, and is sent to market in a very unattractive manner. Good fruit always pays for careful handling and neat packing. Use clean new cases, grade the fruit for quality and size, and carefully examine it for fruit fly, scale insects, or codlin moth. All infected fruit should be destroyed by boiling, and be then fed to pigs or poultry, as its presence in the case is apt to condemn the whole when same is examined by the inspectors under the Diseases in Plants Act.

When codlin moth is present, the bandages should be examined every week, and all larvæ found therein destroyed, and all moth-infested fruit should be gathered and destroyed. If this method of treatment is carefully carried out throughout the season, there will be no great difficulty in keeping this pest in check, as it is not generally established, but is practically confined to the Stanthorpe district and two or three other parts of the Downs.

The fruit fly must be systematically fought by gathering and destroying all infected fruit. This is of special importance in the Stanthorpe district, where it will do considerable injury to the later fruits unless every effort is made to stamp it out as soon as it makes its appearance. Fruit imported into this district from other parts of the State should be carefully examined, and, if found infected, should be at once destroyed, as there is no surer way of giving the pest a good start than by the introduction of infected fruit.

Young deciduous trees should receive their summer pruning where necessary. This pruning consists in the shortening back of long straggling growth, and the thinning out of superfluous wood. Its object is to keep the trees strong and symmetrical, and cause the development of fruit spurs along the main branches. The manner in which the pruning is carried out and the result of such treatment in the past can be noted by a visit to the State orchards at Hermitage or Westbrook. Such a visit will well repay any fruit-grower the trouble and expense of the journey to these farms, and will show better than any writing how the work should be carried out.

The budding of deciduous trees can be done now, the only elements necessary to success being that the bark runs freely, that the buds are plump and well developed, and are tied firmly into their places.

In the coastal districts the planting of pines and bananas may be continued if desired, but earlier planting is preferable, especially in the Southern parts of the State. Tropical fruits, such as mangoes, should be planted during the month, choosing dull moist days for the purpose. Mangoes can also be budded or grafted either by the method of plate-budding described by Mr. Knight in the July number of the *Journal*, Vol. VII., p. 41, and Vol. VII., p. 256 (September), or by means of the saddle graft as described in the January number of the *Journal* for 1899.

All citrus fruits can also be budded, taking care to use plump, well-developed buds, and to see that the bark runs freely.

All young trees in the nursery should be kept well cultivated and free from weeds. They should be trained to a single stem, and staked where necessary. Seedling citrus stalks can be set out in the nursery row during seasonable weather.

There is usually a heavy growth of weeds and summer grass in the orchard during the month, so that every opportunity should be taken to keep them in check by means of the harrow or cultivator during dry weather, as, if this is neglected, they are apt to get out of hand during a wet spell. In the drier parts of the State the orchard should be kept well cultivated, and, where water is available for irrigation, citrus trees should receive a good soaking during the month, taking care to give the land a thorough cultivation as soon after the irrigation as it will stand working, as this tends to prevent the formation of a crust and to retain the moisture in the soil. In the Southern coastal districts mangoes and the main crop of pines will be ripening towards the end of the month, so that in the case of the former every precaution should be taken to prevent their destruction by fruit fly by the gathering and boiling of all fly-infected fruit of all kinds. The destruction of scale insects should be continued by either spraying or cyaniding; and where leaf-eating insects are troublesome, the same can easily be kept in check by spraying with arsenical washes, as recommended in the October number of the *Journal* for 1900.

Where it is proposed to plant orchards on new scrub land this is a good time to fell the scrub, letting it lie till late in the autumn or early winter, when it can be burnt off during dry bright weather. The clearing of forest land can also be continued, the land as stumped being sown with corn preparatory to its being planted with trees the following winter, as the working that the corn receives is a good preparation of the land for fruit.

Farm and Garden Notes for February.

Field.—During this month the land intended for potatoes should be ready for planting. Plant only small potatoes whole. If large potatoes are cut into sets, there is risk of their rotting, as the usual wet weather may be expected with a hot muggy atmosphere. Weeds will be very troublesome, and for that reason the sowing of lucerne should be deferred till later. Sow lucerne in deep, rich soil, thoroughly worked and deeply ploughed. Cape barley, panicum, Kafir corn, imphee, sorghum, and vetches may be sown, but it is risky to plant maize for a late crop, as early frosts would destroy the ripening grain. For an early winter crop sow Swede turnips and mangoldwurtzels.

Kitchen Garden.—Make preparation for good crops of vegetables for the early winter by ploughing or digging all unoccupied ground, supplying well-rotted manure if needed. Chicken guano is also an excellent fertiliser, prepared as follows:—

Spread a layer of black soil on the ground; dump the fowl manure on to this, and pound it fine with the back of a spade; add hardwood ashes and plaster (gypsum), so that the compound shall contain the following proportions:—

Soil, 3 bushels; fowl manure, 2 bushels; ashes, 1 bushel; plaster, 1½ bushels. Mix thoroughly and a little before planting, moisten the heap with water, or better still with urine; cover with old mats and let it lie till needed.

Most market gardeners will have cabbage and cauliflowers ready for transplanting. Do this during the month. Read the article in this issue on growing cauliflowers in the Brisbane district, in which it is recommended that the middle of January (now past) and the middle of March are the best times to sow the seed. Sow "Eclipse" or other large Asiatic variety. If the aphid appears, spray the plants with tobacco solution.

Sow French beans, butter beans, beet, carrot, turnip, radish, cabbages, cauliflowers, cress, peas. Should the weather be dry after January rains, give the plants a good soaking of water. Gather all fruit of cucumber, melon, French beans, and tomatoes, to ensure the continued productiveness of the vines.

Flower Garden.—Thin out and tie up dahlias. Keep the weeds down, never allow them to seed. Sow hardy annuals. This is the best month for sowing, as you will be able to keep up a succession of bloom during the succeeding months of autumn and winter. To ensure this, sow phlox, pansy, daisy, stocks, asters, nasturtium, hollyhock, candytuft, mignonette, sweet peas, dianthus, carnations, cornflower, summer chrysanthemums, verbenas, petunias, penstemons, &c. Dianthus sown now and planted out in March will bloom during the whole year if the dead stalks and blooms are regularly cut away.

Do not sow flower seeds too deep. On the depth will depend greatly what results you will have as regards the seed germinating. It is easy to remember that seeds should only be covered with fine soil to a depth equal to their own size—for instance, a sweet pea is about one-eighth of an inch in diameter; therefore cover it with one-eighth of an inch of soil.

GROWING CAULIFLOWERS.

For the winter crop the seed should be sown in December and January; for the summer crop in June and July, according to handbooks on market-gardening. It is found, however, that the middle of March is an excellent time for sowing. Cauliflowers thrive during our coldest months, and should therefore be planted out in time to ensure their flowering in that season. The seed-bed should be dug to a depth of 12 inches, and, if not composed of rich soil, should be well-manured. It is desirable to protect the seed-bed from the drying effects of sun and wind by sticking in twigs of brushwood in wide rows over the beds. This shelter should not be removed until the leaves are well developed in the young plants. Water the bed both before sowing and at intervals of two or three days afterwards. The soil to which the plants are to be removed when large enough should be of the richest, and, if possible, virgin soil. Otherwise it must be well manured, and in either case thoroughly dug over to a depth of 15 inches. In favourable weather transplant in rows from 2 feet 6 inches to 3 feet apart each way. Water each day until the plants are established, and keep the ground well cultivated soon after watering. A frequent watering of liquid manure will be found very beneficial. When stirring the surface, draw the soil up to the stems of the plants to support them. When the heads begin to appear, water should be freely applied, as the flower is greatly improved by abundant watering.

Two or three leaves should be bent over each flower to preserve the colour and prevent its expanding. Care must be taken to destroy the grubs which eat into the heart of the young plant, and especially should the great black Vaginula slug be watched for. A ring of tobacco dust round each plant or round the whole seed-bed will effectually prevent its attacks, and destroy it.

It is said, although we have never tried the plan, that cauliflowers may be preserved for some time after the crops are over by attention to the following directions:—

Select what may be required for this purpose a day or two before they are quite ready. Pull the plants up by the roots, and tie the tops of the leaves loosely together; then place them in a cool shed amongst damp sand or sandy soil, and they will keep quite fresh for several weeks.

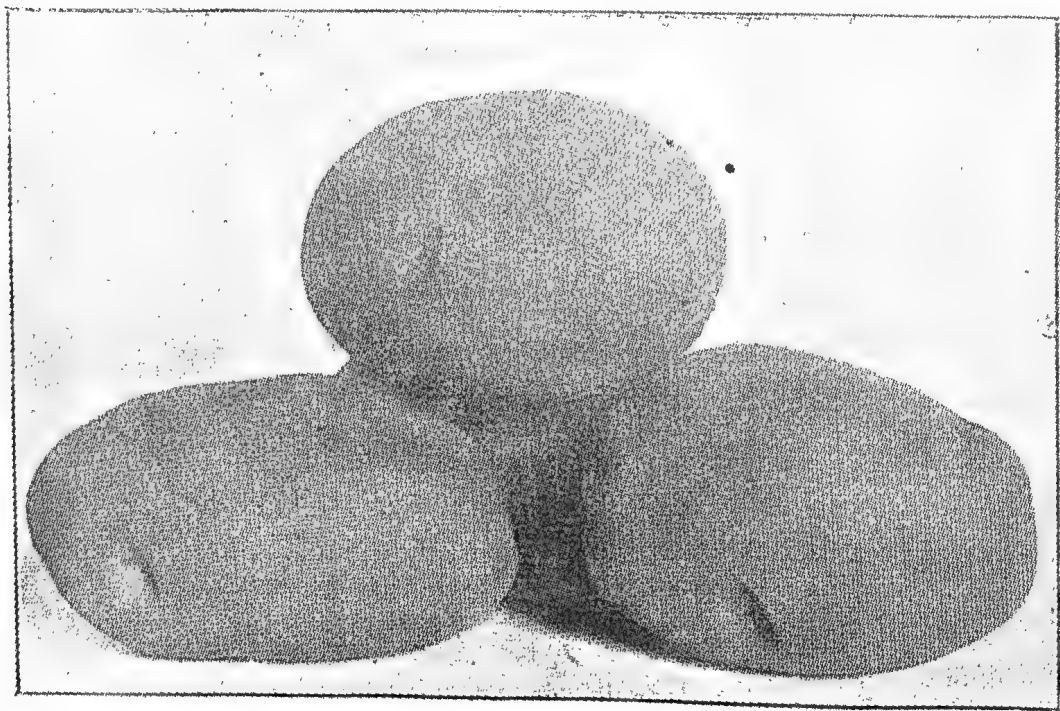
The best kinds to grow are the Large Asiatic, Eclipse, Early Dwarf, and Le Normand.

Agriculture.

THE POTATO BOOM IN ENGLAND.

Most remarkable and positively sensational is the news received last year of the evolution of two or three varieties of the English potato. The area usually devoted to potato culture in the United Kingdom is 1,500,000 acres. It may, therefore, be easily understood that the industry is of immense importance to the country. We do not appear to have yet realised—at least we in Queensland have not yet done so—that no variety of potatoes will flourish for longer than eight or nine years. After that time it begins to deteriorate, and new blood is demanded. In the old country, Messrs. Sutton brought out the *Magnum Bonum*, which was a general favourite with farmer and consumer. Then came the Red American varieties, *Early Rose*, &c. These all had their day, and retired into oblivion, so far as the United Kingdom was concerned. These were followed by the *Up-to-Date* potato, a famous drought-resister, which was largely grown. But now we have news of the sensational advance of the *Northern Star*, which has put every other kind of potato in the shade. It was in 1892 when the *Northern Star* burst upon an astonished world. The *Pastoralists' Review* thus describes this marvellous cropper:—

The leaf is hard, and the epidermis equally hard; the body is beautifully smooth, shape flat and oval, with a pink eye. At Ham, near London, 14 cwt. of seed of this potato were planted; the crop was reared from single eyes. It is necessary to be economical with this variety, as single tubers sell from 7s. 6d. to 10s. About eleven or twelve plants were obtained from a tuber. The result of this experiment is successful; the grower protects the plants from frost, and expects to get about 11 tons per acre. Each root gives a return of some dozen fine tubers. The *Northern Star* is all the rage, and is likely to prove a worthy successor to the veterans *Magnum Bonum* and *Champion*.



THE "NORTHERN STAR" POTATO.

An interview with Mr. Titus Kime, a well-known Lincolnshire potato-grower, is published in the *Agricultural World* of August, 1903, and will doubtless interest our potato-growers here:—

"It is two years ago, is it not," asked the interviewer, "since Northern Star was first heard of?" "Yes," replied Mr. Kime. "Mr. Findlay had raised a small stock of it then, which he sent out in lots of 7 lb. He would not let anybody have more than that. I paid Findlay £500 for a ton, and I bought other lots besides. I sold just under 24 cwt. for £1,035. Last season I planted one-sixteenth part of an acre with 22 lb. of Northern Stars. I had 14 rows, and 35 roots in a row. The yield was 15 cwt. I sold that little lot for £400."

"How much room do you generally give Northern Star? The rows are 30 inches apart, and the setts 24 inches apart. On my finest plot, I left a pathway down the middle, 6 feet wide. When I returned early in August from a visit to Bournemouth for a fortnight, that pathway could not be seen. The potatoes had branched out so that it was completely covered."

"To make the most of the seed, I suppose you plant every eye separately? In some cases I have planted from single eyes, and in other cases from sprouts."

"How did you grow the sprouts? We started the sprouts in pots about February, but that was not so soon as we ought to have started them. Five sprouts were put in each pot, four near the sides, and one in the middle. They were started in a greenhouse, but with very little heat. When they began to show tiny green shoots they were put into single pots and stood out of doors, being protected, of course, in severe weather. Later on they were planted out in rows, great care being taken not to disturb the roots."

"Have the sprouts grown as satisfactorily as the eyes? There is so little difference that now I cannot tell which are which. Four thousand of the setts are from sprouts. You may be interested to know that all the potting of these valuable sprouts was done by Mrs. Kime and myself."

"What weight of seed did you use for your best plot, that acre which has attracted so much attention? It is not quite an acre. Not more than 4 cwt. of seed was used for that. Mr. Findlay estimates that the yield will be 24 tons. It is one-half of that plot with which I have made my challenge."

"Do you mind telling me exactly how you prepared this particular acre of land? If I do I shall be giving away the result of my thirty years' experience of potato-growing, and some people may think that is very foolish of me, but never mind. Here is the history of it. I was determined to prepare that acre just as well as I knew how. The previous year I had grown mangel-wurzel seed on it, and bulbs the year before. I started manuring it last autumn, by ploughing in 10 loads of cowyard manure. It was ploughed in 5 or 6 inches deep. Then I put on 20 tons of rubbish. I must explain what I mean by that. My land grows a great many weeds, in spite of all I can do to prevent it. I don't burn this rubbish as a rule. I make it into heaps. It is turned over from time to time, and when it is thoroughly rotted I apply it to the land. Well, as I have already said, 20 tons of this rubbish were carted on and ploughed in. Then I again manured it with 10 tons of cowyard manure. After an interval, I applied another 20 tons of the rotted rubbish. Then I applied, as a top dressing, 10 cwt. of pure steamed bone and 4 cwt. of nitrate of soda. Potash was applied in the form of burnt rubbish."

"That brings us down to the time of planting? Yes, and now I will tell you how they were planted. In the first place, I must say that we use, for making the hole, not a spade, but an ordinary shovel. A good big hole is made with this. Then in the bottom of the hole is thrown a handful of the burnt rubbish, and on the top of that a handful of wheat chaff. The eye, or the sprout, is carefully planted in the middle of this warm bed."

"You are convinced that Northern Star is a really good potato? There can be no doubt that it is the best maincrop Findlay has ever brought out; it crops well, cooks well, and looks well. It is the most vigorous potato I have ever known in my experience of thirty years."

"It will probaly take the place of Up-to-Date? Yes, Up-to-Date is now past its prime. Its successor has been found in Northern Star."

"Then you would not advise any enterprising farmer to continue growing Up-to-Date? My advice to such is to grow all the Northern Star they can afford to buy. It will be two or three years before the potato can come into the market for eating. Meanwhile, there will be a great demand for it for seed. With regard to Up-to-Date, I should like to say that, in my opinion, that potato and Garton's Abundance Oat have been two of the greatest blessings agriculturists have ever had."

"Is there any other exceptionally good new potato in the market? Yes. Sir John Llewellyn. This is in its third season, and its success is now perfectly assured. There is no disease about it, and for quality, shape, and cropping powers it is the best early potato extant. This year I began cooking it in the middle of June, and it has been all along of excellent flavour and firmness. I have tried it by the side of other earlies, and it has beaten them all."

"Has there been a great demand for this potato? Last season the demand was so great that growers could not be supplied. I feel sure that the same thing will occur again in the coming season."

"It is not yet in the market for eating? No, but I expect a few of them will be eaten next year."

"When I was here two years ago, you thought very highly of Evergood and Ninetyfold—it would be interesting to hear whether you are still of the same opinion? Evergood will come on the market this year for eating. Up to the present, the ware and the seed have all been used for increasing the stocks. I have 30 acres of Evergood. It is maintaining its character, and will carry us on, for general purposes, till we get Northern Star in the field. Evergood came out at about 1s. per lb., but it was worth ever so much more. The next year I bought 1 ton for £65. Last year the price averaged from £12 to £15. This year my idea of price is that it will make about £5, seed and ware. With regard to Ninetyfold, I think the price of that will also be about £5 this year. It will be largely used for boxing purposes. It grows a good weight of stuff by the end of July. If allowed to ripen, it is liable to disease. It should be marketed before the middle of August."

"How many acres of potatoes for seed purposes are you growing yourself this year? Seventy acres, but I buy a great many besides."

"As you are not likely to grow any unprofitable sorts, I should be glad to have a list of what you do grow? Certainly. My earlies are Sir John Llewellyn, Ninetyfold, Puritan, Sharpe's Victor, and Duke of York. Second earlies: British Queen, Royal Kidney, and Elephant. Maincrop: Northern Star, Evergood, Royal Kidney, Goodfellow, Empress Queen, and Up-to-Date."

"Is there anything you would like to say about these varieties? I consider that Royal Kidney is a very good late second early, almost a maincrop. It is a very nice-looking potato, with an excellent flavour. Goodfellow is good, sound, all-round main-crop potato. I am certain that Goodfellow, Empress Queen, and Evergood were all produced from the same stock."

"Have you many potato trials? I try all the new varieties, and some from the Continent as well. The majority of them I discard."

"Then you cannot recommend any other new varieties? No, only Northern Star and Sir John Llewellyn. Those are the best, bar none."

Another farmer says that his potato crop from the new varieties is splendid. Northern Star yielded 27 tons per acre; British Queen 21 tons; and other varieties, 12 tons.

IS THE BOOM JUSTIFIED?

On this head the *Farmer and Stockbreeder*, London, says:—

One of the most sensational and sporting features of the agricultural industry during the past year has been the remarkable boom in new varieties

of potatoes. Those which have been chiefly competing the one against the other for popular favour are the Northern Star, the Evergood, and King Edward VII.; although, of course, there are other varieties of not quite so recent introduction which also have their claim to public notoriety. By the ordinary commercial grower the question is debated as to whether or not the boom is justified, and not a few, in their own way, have been quietly smiling at what they presume is the extravagance of the speculator in new varieties. To question whether or not such a boom as has been experienced during the past two years is justified, one must first of all have reasonable grounds for his contention. Anything short of urgency and the failure of the present maincrop varieties to resist disease would brand the boom as shortlived and engineered for a particular purpose. The past two years have had a salutary effect on the disease-resisting propensities of the ordinary potatoes in cultivation. What, seven or eight years ago, or even a little longer, were regarded as the best disease-resisting and marketable varieties gradually became physically exhausted, so to speak, and where exhaustion sets in disease very speedily follows. This is admittedly the state of affairs in the average potato crops of the country this year. There may be exceptions, but, speaking as a general rule, it is a long time since disease has been so rife and so disastrous in its effects. The floods in the late autumn have only added to the wreckage of the crop, and we fear, from what we have seen, and judging by reports to hand, that very little of the 1903 crop will be put on the market in thoroughly sound condition, or be capable of passing through the winter in the ordinary storage clamps. During the past two years the keeping qualities of potatoes have been very severely tried and found wanting. Therefore, it is more necessary now than ever that new varieties should step in to supplement this lamentable deficiency of the ordinary potato crops of the country. As a rule, farmers are prone to stand by favourites until a few bad seasons finally work their ruin; but we think we are right in saying that the average potato-grower was never keener to move with the times and secure what is best and most profitable for him to grow. We may, therefore, take it that new varieties have a decided function to fulfil, and that it is some time since they were more urgently called for.

Booms, as a rule, are not always dependent upon the ordinary laws of supply and demand. There are other influences at work which tend to inflate values, and the question which the average farmer is putting to himself is whether the very fancy prices quoted and obtained for certain new varieties are justified by the mere law of supply and demand? New disease-resisters are badly wanted. The average farmer will acknowledge that, and the question which he has to consider is whether or not it would pay him to purchase a small quantity of seed at an inflated price. Take Northern Stars as an example. Single tubers were selling at Smithfield Show last year for 10s. each, which is equivalent to about £2 per lb. weight. From the average tuber, with careful cutting, eleven setts can be produced. With equally careful manipulation, whether in pots and planted out, or in a carefully manured and prepared soil, about 5 lb. of really good saleable potatoes will on the average be raised from each of these setts; i.e., 55 lb. of saleable seed potatoes. At the present market price, which the floods of the autumn have raised considerably, 55 lb. of good saleable potatoes should realise from £50 to £70, representing in all not a bad profit for the grower. Suppose, now, one purchaser bought $\frac{1}{3}$ cwt. this year and paid £60 for them, he would secure 600 different settings at least, which means that he would have $5\frac{1}{2}$ tons of good saleable potatoes, with average luck, apart altogether from the chats. He could then afford to sell them at £20 a ton, and realise a handsome profit, and so, as years go on, the price gradually falls, until it reaches the commercial level, each turning a profit on the transaction, and the farmer benefiting in the end. In any case, it takes years to work up a stock, and, as a rule, very few potatoes are capable of lasting more than seven or eight years if the country is well stocked. In these calculations no allowance is made for the small potatoes or the chats, which many consider good enough for seed purposes, although others are ready enough to declare that their

experience leads them to the conclusion that large potatoes can only be grown from whole and large seed. It seems to us, therefore, that the boom, although unquestionably inflated, has some solid basis as a commercial speculation, and those who were enterprising enough to foresee what was likely to happen are doubtless now reaping the reward of their foresight.

MANURES FOR TOMATOES.

Nitrate of soda has been found to increase the yield of fruit by from 35 to 60 per cent., but it should be used in conjunction with other artificials, because potash and phosphoric acid are also required, and these assist largely in increasing the yield and in improving the quality of the fruit. Superphosphate hastens maturing. A good manure, therefore, will be compounded of 2 parts nitrate of soda, 3 parts kainit, and 4 parts superphosphate. Apply 1 oz. per square yard of soil once a week from the time that the plants are established till the fruit has set.

Mr. J. J. Willis, one of the chief coadjutors of Sir John Lawes, says that it is a prevalent idea that the tomato will not stand heavy manuring, but this, he says, is only true of the crop after the fruit has set. In the early stages he recommends the free use of the artificials above mentioned, but, after the fruit has set, manuring with farmyard manure or other stimulating fertilisers delays the development and ripening of the fruit.

Coal ashes have a remarkable effect in stimulating the growth and yield of tomatoes. In "Johnson's Gardener's Dictionary," an instance of this is given. A tomato-grower had a brick-built pit in which he used to place pot plants during the winter. He conceived the idea of adding more furnace ashes to the pit, and planting tomatoes in it. A shovelful of fresh cow manure was the only stimulant added, merely placing some beneath each plant, returning the ashes to each hole, then placing a tomato plant on the spot. The hose was freely used when the plants were established, the result being a heavy crop of fruit of fine size and quality. Some of the plants extended to 18 feet in length year after year in the same ashes. Moreover, the "spot" or "sleepy" disease never made its appearance.

We have seen immense tomatoes at the old Mount Hogan diggings, in North Queensland, in the Gilbert District. The place was, at that time, abandoned. In looking over the old machine site, we found hundreds of magnificent ripe fruit growing on plants which were self-sown apparently on the ash-heap from the engine.

A correspondent of the *Gardener's Magazine* writes as follows:—We this season conducted an experiment with late plants of tomatoes, treated with potash, with non-treated plants to check the experiments, with the following results:—

With potash	...	...	...	...	...	76½ oz.
Without potash	...	...	...	...	...	58¾ oz.
Increase from potash	...	...	...	...	...	17¾ oz.

From a box of plants of May's Favourite seventeen were selected, and the five worst plants were rejected. The remaining dozen were potted singly in 8-inch pots, in poor sandy soil from the bottom of a dry bank. These were paired with regard to vigour, and potash supplied to one of each pair as follows: 8th June, ¼ oz. sulphate of potash; 26th July, ¼ oz. sulphate of potash; 25th August, ¼ oz. sulphate of potash; total for each plant, ¾ oz.: aggregate total, 4½ oz., at a cost of less than ½d., so that, estimating the worth of increased yield from potash at 4d., there was a gain of 3½d. on ½d. expended. After potting, the plants were started a fortnight indoors, then were stood outside upon bricks to prevent the roots growing into the ground. A noticeable fact in weighing was that fruits of potash-fed plants were heavier for their size than those from plants not so fed.

THE MOTOR CULTIVATOR TO MAKE BRITISH CORN-GROWING PROFITABLE, AND THE HARVEST SAFE IN WET SEASONS.

The harvest of 1903 is not calculated to give encouragement to corn-growing, as at present practised in this country. In addition to foreign competition and the low price of grain, many farmers, from no fault of their own, have been powerless to contend against the wet season, and a large proportion of the corn crop, in these cases, is rotting in the fields, or has been stacked in a much damaged condition. Yet corn-growing is a necessity, yea, a three-fold necessity with us: for, like all the world, we need bread corn in a daily increasing quantity; and in this climate stock-feeding cannot be carried on without arable farming; which, again, is impracticable, as a general system, without the intervention of white crops. Apart from the latter necessities altogether, it is time that the people of this country disabused their minds of the idea that it is cheaper to import bread corn even than it is to grow it. Beyond a doubt our farmers can still grow corn against the competition of the world by adopting a mechanical agriculture: and the same system will largely discount the risks and disadvantages of our humid climate, by making harvest operations the work of a single day on any given field, instead of a matter of weeks or of months, as has been too common an experience this year. Not that the progress of mechanical agriculture has hitherto been small in some directions. Far from it. The self-binder alone has already effected an enormous economy in the harvesting of corn crops. Still, in this one direction even, it will be seen that we have not yet utilised machine help to anything like its profitable limit. In the ordinary practice of corn-growing at present, a two-horse binder cuts at most 10 acres a day, at a cost, for cutting and stooking and binding twine, of about 4s. an acre. Carrying, stacking, thatching, and threshing up to 17s. 2d. an acre. The same work can be done by a motor-harvester, which will reap and thresh at the same time, at a cost of not exceeding 9s. 4d. an acre. Here are the comparative figures:—

COST OF HARVESTING AND THRESHING TEN ACRES.

1.—By Ordinary Methods.

				s.	d.	s.	d.
Cutting and stooking	...	...	...			25	0
Two horses and machine binder	...	...	...	9	0		
One man driving	...	...	...	4	0		
Three men stooking	...	...	...	12	0		
Binding twine	...	...	...			16	6
Carrying sheaves	...	...	...			43	0
Two men pitching	...	...	...	8	0		
Five men carting	...	...	...	20	0		
Five horses and carts	...	...	...	15	0		
Stacking	...	...	...			22	0
Two men building	...	...	...	8	0		
Two men pitching	...	...	...	6	0		
Two men dressing ricks	...	...	...	8	0		
Thatching, at 1s. 6d. per acre	...	...	...			15	6
Threshing, 50 qr. at 1s.	...	...	...			50	0
Total cost of ten acres	...	...	...			172	0
Cost per acre	...	...	...			17	2

2.—By *Motor-Harvester*.

	s.	d.	s.	d.
Cutting and threshing			39	6
Motor-harvester one day	12	0		
Petrol and lubricating oil	13	6		
One motor-man	6	0		
One man at sacks	4	0		
One man at straw	4	0		
Binding twine			16	6
Carrying threshed corn and straw			30	0
Motor-wagon one day	8	0		
Petrol and lubricating oil	8	0		
One motor-man	6	0		
Two men loading and unloading	8	0		
Stacking straw			8	0
Two men stacking	8	0		
Total cost of ten acres			94	0
Cost per acre			9	4

By motor-harvesting and motor-wagon eight men reap and thresh and carry and stack 10 acres a day, at a cost of 9s. 4d. an acre; by ordinary methods the same work requires four men and two horses cutting, seven men and five horses carrying, six men stacking, three men and two boys thatching, and ten men and two horses threshing—in all, one day's work of thirty men and two boys and nine horses—at a cost of 17s. 2d. an acre; a difference of 7s. 10d. an acre in favour of motor-harvesting. Besides this saving in money, there is the great saving in time, and securing the crop against bad weather, which means everything in a season such as this. How much has been spent this harvest on restocking and trying to keep the sheaves on end?—and all in vain. How many ricks have been damaged by rain after the corn has got the length of the stackyard? and how much more damage will be done to these ricks by over-heating and by rats, mice, and birds, before the corn is threshed in the spring? A very good authority, Mr. John Speir, estimates that one-third of the grain crop of Scotland is damaged this year. And for the whole of the United Kingdom it is probably well within the mark to say that 1,000,000 acres have been utterly ruined. All this loss and waste might have been avoided by reaping and threshing at one and the same time; there would have been no damaged corn; the sample would be brighter and sweeter than if threshed from the stack, and worth at least 1s. per quarter more on that account; while grain threshed on the field weighs 1 lb. per bushel heavier than from the stack, which alone is an increase of nearly 2 per cent. No arguments which it is possible to advance against the reaping and threshing at one operation will weigh for one moment against its many advantages.

But this is not all. The motor-cultivator will effect as great a saving in the cost of corn culture as in reaping and threshing. With horse labour, the average cost of corn cultivation, taking all kinds of corn, after clover or roots, cannot be put at less than 12s. 10d. an acre for ploughing, drilling, or sowing, harrowing and rolling; whereas the motor-cultivator or plough, with seeder and roller attached, will do the whole in one operation, at a cost of 5s. 8d. an acre. Let us now see how the total cost of corn-growing will compare under the two systems:—

	Ordinary Method. Per Acre.		Mot. Cultivation. Per Acre.	
	s.	d.	s.	d.
Cultivating and seeding	12	10	5	8
Reaping and threshing	17	2	9	4
Total cost per acre	30	0	15	0

There is thus a saving of exactly one-half, or 15s. an acre, by motor-cultivation. On the British corn crop of 8,500,000 acres, this would be a clear gain of £6,375,000. To the above costs, per acre, add for rent and taxes, say, 30s., and for marketing 4s. in each case, and it makes the total cost of the corn crop £4 5s. an acre by ordinary methods, and £3 10s. an acre by motor-cultivation, which, with an average yield of 40 bushels an acre, would be equal to 2s. 1½d. per bushel and 1s. 9d. per bushel respectively. With the cost reduced to 1s. 9d. per bushel, there is hope for the British corn-grower yet, notwithstanding low prices, foreign competition, and all the other drawbacks. It rests with British farmers themselves. The great bonanza wheat farmers of Dakota and California, whose experts have largely controlled the prices of corn in this country during the last twenty or twenty-five years, cannot put their wheat in the sack at less cost than 1s. 9d. a bushel; and we have the great advantage of the home market. Though the prices of both overland and ocean freights have fallen of late years, these still amount to about 1s. a quarter on corn coming through the Atlantic ports, and to 5s. a quarter on corn from Argentina exported to the United Kingdom. This is not a very large margin in our favour; still, it is equal to 20s. or 25s. an acre: and, taken in conjunction with the greater number of bushels grown on an acre of land in this country, is more than sufficient to wipe out the difference between the rent of corn land here and in the countries which send us corn. What is true of corn is true of every other crop grown on the farm. There are even greater possibilities for the motor in potato culture than in corn culture. And motor-cultivators can be made of all sizes to suit the market gardener or small occupier, as well as the large farmer, with prices proportionate. Moreover, by a slight interchange of parts the same motor will cultivate and seed the land, reap and thresh the crop, and carry it to market; also do other haulages, and stationary work, such as grinding, chaff-cutting, churning, pumping, sawing, or will drive a dynamo for electric lighting. The system of mechanical agriculture, which is here in part briefly outlined, is not a mere paper contribution to the subject. It has been tried in part, and with every promise of ultimate success. Its evolution has, indeed, proved difficult, slow, and costly beyond all anticipation; but after five or six years devoted to persistent experiments in this direction, and to designing and building machines to do the new work required of them, I say, with all confidence, that there is nothing propounded in this article which I cannot safely undertake to do against another harvest.—*Scottish Farmer*.

GOOD ROADS.

In the days when the Romans, under various emperors, extended their conquests to other lands, they invariably gave great attention to the construction of good military roads, especially in countries which they permanently occupied. These roads were so well constructed that they have lasted for over eighteen centuries, and are as good to-day as when the Roman generals, the soldiers, and the conquered peoples laboured at them. To construct such roads at the present day would be out of the question, for the cost of them would be prohibitive, no forced labour being available, as it was in Cæsar's day. Neither are such splendidly built roads necessary for ordinary country traffic. But, whilst we have been expending our energies and large sums of money in establishing an excellent railway system, we have most shamefully neglected our high roads. Time was when high roads and bridges were made, built, and maintained by the Government, and the main roads, at least, were kept in a good state of repair, because money could generally be found to carry out such public works, and to maintain them afterwards. The building of railways to the interior caused neglect of the main high roads. Coaches and wagons, bullock and horse teams being discarded for railway carriage, it was deemed no longer necessary to keep the road in repair. When



A SCRUB ROAD IN THE MAROOCHY DISTRICT.

the old road boards were done away with, there was no one to attend to the matter, and travelling by road became fraught with discomfort, damage, and danger. Nearly a hundred years ago the United States Government was engaged in projecting and building extensive systems of public highways to develop the resources of the country, and probably that policy would have been continued but for the rapid growth of railway systems that seemed better adapted to the needs of the expanding business and the increasing traffic of the country. Within recent years there has been no adequate system for maintaining the highways in that country, and, as an American journal puts it, "their condition in this age of general development is a disgrace to a civilised nation."

Now, an Office of Public Road Inquiries has been established through the Department of Agriculture, and this office is maintained by yearly appropriations from the public Treasury, resulting in great good in promoting road improvement, and there has been an increasing demand upon this office, not only for achieving aid, but for material assistance. In responding to the people's call for Government aid, there has been made a safe and healthy beginning, and the time is opportune for enlarging and extending the work in that country.

In our State of Queensland the making and maintaining of the roads devolves upon the Shire Councils, who are empowered to levy rates for these purposes. In many parts of the country, such as in mountainous districts, as, for instance, in the Blackall Range and Main Range, and on vast stretches of deep alluvial or volcanic plains, such as the Darling Downs, the formation of good solid high roads is beyond the means of the Shire Councils, whose funds have many other calls upon them. A great many necessary public works in the various shires have to be carried out by the aid of loans from the Government, but these loans have to be repaid, together with interest. If loan after loan is granted, and repayment deferred to the Greek Kalends, then it practically amounts to the work being done, as in olden times, by the Government. It was precisely to avoid this, that, together with other reasons, local government was established. The old system gave rise to many abuses, and easily obtained grants for local purposes were often diverted from the objects for which they were intended, and expended in some other direction. In some districts, the roads are a credit to any country, but when the highways are in such excellent order it will be found that the local conditions are all favourable to inexpensive, yet effective, road construction. The greatest trouble about roads exists in the farming districts, and in many of them road-making is limited to throwing up a heap of black soil, and building culverts over the worst gullies. Metalling the black soil road is useless under such conditions, and the Shire Councils are not in a sufficiently flourishing condition financially to incur the great expense of properly "building" roads over the rich alluvial plains. During a continuance of dry weather there is no trouble with the plains roads, unless it be in districts where they are badly cut up by timber wagons; but in wet weather travelling by wheeled vehicles is next door to impossible. A glance at the illustration on another page, of a road in the Maroochy district will show the sea of mud and water the unhappy settler must struggle through to reach the railway. The worst roads in this State are, as stated, in the hill country and on the blacksoil plains. It is possible to ride or drive over the latter during heavy rains, but when the soil begins to be less saturated, travelling, if not impossible, is exceedingly hard on horses and bullocks employed in wheeled traffic. In the mountainous country the farmer has to contend with very steep gradients, as well as with deep, adhesive mud. In the Blackall Range, the pioneers of settlement were the timber-getters. Their bullock teams drew the logs from the scrub by the nearest route, irrespective of steepness, as the road to the railway is all down-hill, and the teams returning with empty wagons were able to negotiate the steep bush tracks. When the farmer came along, however, to settle on these lands, the question of roads became a very serious one. But those responsible for

opening roads for the farmers contented themselves with improving the old bullock tracks, by taking out a few stumps, cutting down a very bad sidling, leaving a road so narrow as hardly to allow two carts to pass each other. And even where the worst steeps were reduced by heavy cuttings, the gradient in several places is 1 in 2. We have only lately seen a bullock dray, empty, drawn by sixteen bullocks, stopped twice on one of these long, steep hills, to rest the animals. Those who are learned in the traction power of draught animals have proved, by incontestible figures, what actual force has to be expended by a horse in drawing a certain load on level and on steep roads. It appears, by tables published by the Department of Agriculture of the United States, that a horse can exert a tractive force of 83.33 lb. for ten consecutive hours at the rate of 3 miles per hour. This means that he can move a ton for 30 miles in 10 hours over a smooth, well-made gravel road. But taking a grade of 1 in 30 he can only move it 11 miles. If the gradient is increased to 1 in 10, he could only move it 5 miles. How far could he move a ton on such a road as we have described, *i.e.*, the road from Nambour to Dulong, where the gradients are so very steep? He could not move it at all. A settler at Mapleton has been bringing cedar in fitches down this range. His load, with four horses, does not exceed 600 feet. The distance is about 9 miles, and it takes the best part of two days to go and return. We do not enter here into the question of wear and tear on harness and wagon, which must be considerable. Then there is the loss of time to the driver. That is of as great importance as any other factor in the business. There are three ways of improving this state of affairs. The existing roads where these excessive gradients occur could be divided into sections of steep and level. If short level stretches were to succeed short pinches before the strength of a team is exhausted by a long pull, the cattle would be on level ground, and there recover breath and move easily on to the next short steep to be negotiated. Thus the top of the range would be reached in shorter time, and with greater ease to the cattle. The second plan is to abandon the road where these steeps occur and contour the ridges. There is a piece of country running below the pinches we mention, where a road could be carried in two or three miles, which would not have a gradient of more than 1 in 30, and which would, in even a shorter distance, reach the objective point beyond the ridges. This is only a single instance of many mountainous roads in the State which we could point out. The third and best way of overcoming the gradient difficulty is the narrow-gauge tramline. Such a tramline has now been built in this particular part of the range, and an 8-h.p. motor-car has taken a load of 5 tons up the range at the rate of 3 miles per hour. We believe that not even one ton has ever been taken from Nambour to Mapleton by horse-power and wagon.

As for the black soil plains, the building of roads, as we have pointed out, is a matter of *natura locis*. Stone and gravel are plentiful in many parts of the Darling Downs, or of the Downs country of the Central and South-Western Districts, and where such is the case excellent roads have been constructed, as witness the road running from Warwick to Freestone and Swan Creeks. Many persons know that for a long time it was deemed impossible to make a road of any kind across Chatmoss, in England. Millions of tons of stone were emptied into it to form a road for the railway, only to be swallowed up in its bottomless abysses. Yet, to-day, the trains run regularly across this shaking bog. The roadway was made of fascines, on which the sleepers, rails, and ballast were laid, and the road is as solid and firm as if it ran over rock. Our blacksoil plains are not bottomless. But, if the top crust is broken, many more tons of broken metal would be required to form a firm road than if it ran over a sandy plain. Here fascines would come in. The road could be formed, drains made on each side, the surface laid with fascines, as has been done in the case of the training walls at the Hamilton Reach of the Brisbane River, and on these fascines a firm roadway could be built. We propose to continue this subject of good roads for farmers, as it is one of vital

importance to them, and we shall endeavour to throw all possible light on it, in the hope that eventually the proverb about dropping water wearing away a stone will be realised in the determined effort of all Shire Councils to provide easy means for farmers to bring their produce to the various railways.

HARVESTING AND STORING MANGELS.

In Europe there are several ways of harvesting and keeping the mangel crop. The *London Agriculture Gazette* has the following from a correspondent:—Usually wheat seeding is in full swing just when mangels are ready for carting. When this is the case, the plan is to top the mangels and throw them into heaps of about a load in a heap, or less, and cover with the leaves. This is a very good plan when, as I said before, teams are busy drilling. A good covering of leaves will keep out an ordinary frost, and the bulbs get nice and dry. The dirt shakes off in the loading and emptying, and the remaining tops shrivel up, leaving little risk of heating in the grave. This plan, however, is not by any means the most expeditious or the cheapest plan. As the weather is, wheat drilling is almost an impossibility, so nothing hinders carting the mangels off as they are pulled. The plan is to have men or boys to pull up the roots, the number regulated according to the fillers. The mangels should be pulled and laid in a line, two rows put to the right hand and two to the left, thus placing four rows of mangels in two lines. Care must be taken to lay the leaves straight. One boy then should follow and cut off the leaves with either an ordinary turnip cleaner or a light hedge knife. The tops should be cut rather more than an inch off the crown of the root, so that the leaves may fall separate. There will thus be two lines of roots each side of a track wide enough to allow a cart to pass through. Four men can economically be employed to fill, and with a few hours' start four will pull up and top the roots. This will cost somewhere about 8s. to 10s. per acre. Two men will pack the mangels away as they are brought home. For storing the roots two rows of hurdles may be set down on a dry piece of ground in parallel rows to each other, 8 or 10 feet apart, the space between these rows to be filled with mangels, the carts being backed between them and tipped. This line of hurdles on either side will be found to save a lot of hand packing. The roots should be piled up as high as is required above the hurdles, in a ridge-like form, to be afterwards covered with loose straw, and then either thatched down or covered with earth. Every few yards it is advisable to place a faggot in the middle of the heap, reaching to the top of the roof, to act as a sort of chimney. This will supply ventilation and hinder any tendency to heat. The sides of the hurdles should be filled in with straw, and the thatch reach to the floor. Only dry straw should be used as a covering. This not only will be a better protection from frost, but will also allow any heat that may generate to escape. It is well to remember, in case of mangels getting frosted, that it is fatal to put them in a heap in that condition, but if left until the frost is well out they may be harvested with every prospect of turning out well.

STORING MANGELS.

We are indebted to Mr. L. Stemp, of Palmwoods, for the following description of the method of storing mangels adopted in England:—

In reference to your advice to "Novice," Bald Hills, *re* storing mangolds, or, mangel-wurzel as they are usually called, I will give you my mite of knowledge on the matter. But, first, one sentence from the "Farmers and Fruit-growers' Guide," of the Department of Agriculture of New South Wales:—"The great advantage in mangels is their keeping property" (page 99). Now, from experience in England, I can verify that statement, for, while turnips and swedes were usually fed off the ground, mangels were always stored away in autumn for winter and early spring use, and, if stored in a reasonably dry place and clear of frost, not one in a hundred was found

rotten, not even those broken in handling; and they improve by keeping, for, the water evaporating, they became sweeter and firmer feed.

The method of storing was this:—A place high and dry was chosen, as convenient as possible to the farmstead. The leaves were stripped off—not cut off—by taking half in each hand and stripping downwards; then, if of the long red sort, they can be mostly lifted with both hands and tossed into the cart at once; but, if of the Globe variety, a strong potato fork is used to raise them. They are then carted to the chosen spot, tipped up, and stacked in a long heap—say, 10 feet wide and 6 feet high in the centre, roof-shaped, crowns outward as a facing, then covered with straw or ferns and thatched, or banked up with soil taken from each side. The latter method provides drainage and protection from under-damp. In covering the stacks with soil, a wisp of straw as ventilator is placed every 6 or 8 feet at the top. If a barn or shed is available, so much the better. Another method, if they were intended for sheep, was to stack them in small heaps in the field, about a chain apart, covered with straw and soil as above. Of course in our climate the keeping them dry would be the main thing. I believe our heavy, rich, scrub soil would grow them to perfection, provided the climate is not rather too warm; and their suitability for the dairy farmer, for milking cows, and breeding sows is, I think, beyond question, as they are said to leave no taint in the butter, and are heavy croppers in rich soil. In fact, the New South Wales authority above mentioned says that in New Zealand from 30 to 60 tons per acre are not uncommon. They should fit in well with sugar-cane as feed, as the latter, if cut in winter, will not ratoon, which is a great loss.

Commenting on the above, Mr. P. McLean, Agricultural Adviser, writes:—

“The difference between the climatic conditions of the old land and this new one is so great that the systems of harvesting crops differ very much, as, for instance, in Britain turnips, potatoes, mangels, and other root crops must be stored during the winter months under such conditions as to render them safe from the hard frosts which prevail; the growth of such roots, under protracted seasonal conditions, rendering them better fitted for storage purpose than if grown in the genial climate of this State.

“Except in very few cases, the cultivation of mangels as a fodder plant has not been entered upon here, and, when it has been grown, it has been found to keep perfectly sound and good for many months, standing in the ground where grown; whereas, had they been pitted as is done in the old land, a few weeks would have rendered them valueless.”

LUCERNE ON CLAY SOILS.

The *Agriculture Gazette*, Hobart, says:—It is probable that no better crops of lucerne can be found in this country than are grown in some of the worst parts of Essex on clay of the most tenacious and difficult description. We remember walking over a farm in one of the worst districts, which was on offer at a very low price. With the exception of one field the whole farm was derelict, hedges ruinous, gates broken, and a few head of stock running precisely where they chose. The whole farm, some 200 acres in extent, was left in charge of one labourer, who employed others to help him to gather in the crop of the one cultivated field, and that was lucerne. The owner had tried an experiment, with the result that the crop of lucerne which he produced—and which we saw—was simply magnificent. The whole of the farm might have been covered with the same plant, with the result that a large profit would have been realised instead of serious and demoralising loss. The man who can buy 100 acres of heavy soil of such character at £10 an acre—and many such farms have been sold in the past few years—who cleanses it, and sows it down to lucerne, may practically rest upon his oars in all but those rainy seasons in which hay and similar crops are difficult to harvest.

THE CULTIVATION OF SWEET POTATOES.

THE SOIL.

The best soil for sweet potatoes is fairly rich, dry, sandy loam, or a light volcanic soil. Heavy crops cannot be expected on heavy, rich, black soils. On the latter there may be a heavy crop of vines, but very few good tubers, the majority of these running out into long, thin roots.

PREPARATION OF THE GROUND.

The land should be ploughed deeply, and, if the soil be very poor, potash and phosphatic manure should be applied—550 lb. per acre of a fertiliser, containing available phosphoric acid, 7 per cent.; potash, 9 per cent.; nitrogen, 4 per cent. Most growers throw the land up into flat ridges from 3 to 4 feet apart, and plant the vines on the top.

PLANTING.

The sweet potato is usually propagated by cuttings from the vines, about 3 inches to 12 inches in length. Open the top of the ridge with the plough, and set the cuttings about 18 inches apart. The soil is then thrown back by a specially made plough, and pressed against each plant with the foot; or the cuttings may be planted by the help of a dibble, just as in planting out cabbages. When vines are unobtainable, some small tubers should be procured and planted in a well-prepared bed in May. An abundant supply of shoots will be thrown up, ready for transplanting in spring. These should be covered with some litter during the winter to protect them from frost, sweet potato vines being very susceptible to frost.

If the vines appear to be too heavy, which will, however, not be the case on a sandy soil, they may be cut back and fed to pigs or cattle, and the drills must then be hilled up afresh. Another plan is to twist up the vines in a heap on top of the roots; and, again, another is to turn the vines over from one side to the other of the row about once a fortnight. By so doing all the potatoes become fully developed.

DETERIORATION.

Owing to the constant planting of cuttings from the same stock, the tubers deteriorate and become diseased. The grower will, therefore, do well to obtain cuttings or young tubers from another district. Another certain plan of obtaining a clean crop free from disease is to grow the plants from seed, as has been done at St. Helena last year. A notice of sweet potatoes thus produced appears in this number of the *Journal*.

KEEPING THE TUBERS.

Sweet potatoes may be kept fresh and good for a long time by pitting them with sand. Put down a thick layer of sand, either in the barn or in a well-drained spot outside. On this place a layer of tubers, then run in sand till all the crevices are filled up and the layer is covered. Repeat the process until as many as are desired are pitted. Then cover with straw or bush hay.

A RECORD CROP AT ST. HELENA.

In the year 1888 a crop of sweet potatoes was harvested at St. Helena, which, we believe, has not yet been equalled there or elsewhere. The soil of the island is red volcanic, rich enough to require no manure. Twelve acres were planted with sweet potatoes, on 6 acres of which the yield was 35 tons of saleable potatoes per acre. One hundred and fifty-five tons 9 cwt. were sold for cash at an average price of £4 15s. per ton, some fetching £6 10s. per ton. Over 38 tons were used for domestic purposes, and the balance was fed to stock. The largest potato weighed 34 lb. The variety grown was the Maltese, and they were planted on ridges 3 feet apart. The season was very

favourable as regards rainfall, and the high price obtained was attributable to the partial failure of the English potato crop. The total value of the crop sold was £919 2s. 6d. If the produce of the 6 acres had been sold at the higher price—viz., £6 10s. per ton—the return for the 210 tons would have reached £1,365.

SWEET POTATOES FROM SEED.

We are not aware that sweet potatoes have ever been grown in this State from seed prior to the experiment made last season at the Penal Establishment at St. Helena, which has proved eminently successful.

From a report on the experiment by Captain C. Pennefather, Comptroller-General of Prisons, forwarded to the Secretary for Agriculture, we take the following:—

“Some vines raised from a few small sweet potatoes given to us by Mr. C. E. Hayes in 1898 were planted out in 1899, and in 1900 the Chief Warder noticed on the vines grown from these tubers several pods which contained two or three seeds each. These seeds were sown, but, although a great deal of trouble was taken, only eight seedlings were raised. A large number of plants came up, but most of them died off. This was in 1901.

“These seedling vines were planted out, and the result was very satisfactory. Owing to the drought last year (1902), which delayed the planting of the vines until November, the crop was not very productive, but the tubers grown are large and sound. A few lilac-coloured stalks were found among the vines when the potatoes were being dug, and these were planted out.

“The result is, a potato different from the other in colour (being a bright yellow when boiled), and the shape of the leaf is different.”

The favourable result of this experiment should prove of great interest and value to farmers who grow sweet potatoes for the market. Of late large quantities of tubers grown from vine cuttings have proved to be diseased, and the continuous planting of cuttings of vines from the diseased tubers can but have the effect of perpetuating the trouble. The raising of a totally new variety, perfectly free from disease, should result in banishing the disease from the fields of those who can either obtain healthy cuttings or raise new varieties for themselves.

NATURAL MANURE.

There is a kind of manure used on the cultivated fields at the St. Helena Penal Establishment which is obtained from the foreshores of the island amongst the mangroves, but is usually dug out at some distance from the beach, in order that the foreshores may not be injured by the wash of the sea, although the holes made in digging out the mud gradually get filled up with silt, decayed leaves, &c.

When this mud is dug, it is stacked in heaps about 6 feet high, and is then left out of the reach of the tide for some months, after which it is carted to the fields and laid in heaps—a drayload to every 6 yards. Then it is spread over the fields and ploughed in.

There are thousands of tons of this natural manure procurable from the shores of Mud Island, Peel Island, and other islands in the Bay. An analysis of this mud was made by Mr. J. C. Brünnich, Chemist to the Department of Agriculture, who says that it has undoubtedly a fair manurial value, on account of the large amount of humus and the fair amounts of nitrogen, lime, and potash it contains. Still, the mud must be used with caution on account of the large amount of salt (chlorine), which has a detrimental action on many crops.

ANALYSIS OF MANGROVE MUD (AIR-DRIED).

	Per cent.
Moisture	5.93
Organic matter and comb. water	20.87
of which—	
Nitrogen 1.342 per cent.	
Humus 10.820 „	
Soluble in hydrochloric acid—	
Carbonic acid ... ..	.12
Sulphuric acid	6.51
Chlorine	5.92
Silica ... ..	.62
Iron alumina	14.96
Phosphoric acid ... ..	.16
Lime	3.07
Magnesia	1.34
Potash ... ..	.49
Soda	4.37
Insoluble in hydrochloric acid—	
Sand, &c.	37.37
	<hr/>
	101.73
Less oxygen equivalent to chlorine	1.34
	<hr/>
Total	100.39

LIVING WILLOW WEIRS.

To anyone who has observed the rapidity with which weeping willows grow in this State, especially on the Darling Downs, the following idea, which we take from the *Farmer and Grazier*, will at once commend itself, if only for its simplicity and feasibility:—

One of the lessons taught by the drought is the necessity of conserving our water supplies, and many minds throughout Australia have been employed as to the best and simplest means of attaining that end. The construction of weirs over the Murray and other large sources of supply is a national work, and can only be accomplished by the Government at considerable expense, but the weiring of our smaller rivers and creeks, of great local importance, can be carried out by shires and water trusts at a very limited cost. Perhaps the most novel, and, at the same time, practical scheme for our smaller waterways is that of Mr. T. Ambrose, a practical gardener in the employ of the Victorian Government. He has a simple way of taking control of the running water, while he plants across the bed and banks of the stream a weir of willow studs, which are supported by logs or any suitable material at hand. The water is then allowed to flow through the willow studs, which soon become one conglomerated mass of roots and fibre, which continue to grow and thicken, and in time form a consolidated weir of fibre, silt, &c., that will withstand any ordinary flood.

Readers who have observed the prolific growth of willow root and fibre know that when they take hold of the bank or bed of a river nothing in Nature will move them, and many a stream has changed its course because of the solid mass that blocked the original way. Mr. Ambrose, who has over thirty years' experience, considers a willow weir planted by his method will in one year form a solid weir 6 feet in height and a 10-foot weir in two years.

Mr. Guilfoyle, Director of the Melbourne Botanical Gardens, reports very favourably on the scheme. He says:—

"Having examined the model of the Ambrose willow weir patent, I believe the system on which it is based to be practicable, and, in fact, a cheap and effective method of conserving large quantities of water in small rivers, creeks, &c. The wonder is that such a simple scheme of weir construction for such places was not thought out long ago. I would suggest that the patentee be afforded every facility to construct or superintend the construction of one or more of these willow weirs, in order to prove their efficiency, say, on some well-known creeks in country districts. I think there can be no doubt as to the result, providing the willow truncheons are fairly thick, planted during the winter season, and that they can be kept firmly in position by the use of plenty of turfy matter and debris, such as stone, &c."

Weirs so constructed in the various rivers and creeks would conserve water in the most effective way, because, when one weir is full, the overflow goes down stream to others, so everyone benefits. The Broken River, the Werribee, Deep Creek, Jackson's Creek, the Lerderderg, and the Upper Yarra may be taken as examples where water could be conserved and used for irrigation with great profit. The overflow can be used as a motive power to raise water to higher levels. There is plenty of water in Victoria, now running to waste, which could, and should, be conserved and utilised. In this scheme, no engineering ability is required in the construction of dams, weirs, or retaining walls.

MOTORS FOR HARVESTING—ANOTHER VIEW OF THE QUESTION.

A farmer (Mr. Ford), writing to the *Agricultural Gazette*, London, apparently has little faith in the value of the motor as a factor in reducing the cost of harvesting. He says:—

It is with much interest that I read the various articles and correspondence on agricultural subjects in your paper. Some of your correspondents think that farmers are not interested enough in the letters to follow the advice which is prescribed. Well, anyone can make farming pay (on paper), but let them start and practise some of the theories, and they very soon find their mistake. There is no wonder that Mr. John Scott was led to advocate the use of a motor in harvesting and for general farming if the cost of harvesting, as tabled in your last issue, was followed on throughout the year on what I would call extravagant lines.

What Southerner, even within thirty miles of London, where labour is very scarce and dear, would ever think of paying 17s. 2d. per acre for cutting, carting, thatching, and threshing? Cost of harvesting and threshing 15 acres, ordinary methods:—

	s.	d.
Cutting and stooking—		
4 Horses and machine binder (1 horse valued at 2s. 6d. per day) ...	15	0
Man driving and boy to assist in sharpening knives and feeding horses ...	6	0
3 Men stooking ...	10	6
Twine ...	25	0
Carting—		
4 Men pitching ...	16	0
1 Boy leading to stack in field ..	1	0
4 Horses and carts (ample) ...	12	0
Stacking—		
Use of elevator and 1 pony ...	5	0
1 Man unloading, 3 on stack to build and help ...	14	0
Thatching stack (if properly built it would go in one stack easily, and be about 10 square thatch) ...	10	0
Threshing 75 qr. at 1s. ...	75	0
15 Acres ...	189	6
Cost per acre ...	12	9

The farmer already has his implements and horses, which must be discarded for motors, and there is not one farmer in a hundred that has the capital to lay out, even if he were inclined. I don't know the working of a motor-harvester, but I fail to see or believe that two men will load and unload 10 acres of corn and straw regularly enough to enable the motor to continue work. Again, a motor-harvester could not have worked at all this present season, and it is very doubtful if it could in any other season in England. I think there have been but one or two days for some years past when corn was in condition enough for threshing as it was cut, and even then what is to be done with the chaff, &c., and straw, which is almost as valuable as the corn in some seasons? I think there are several weighty arguments against reaping and threshing by motor:—

- 1st. A great outlay, without prospects of sufficient interest thereon.
- 2nd. The enormous risk against attacks of birds and shedding of corn, through waiting until the grain is dry enough for threshing.
- 3rd. Inconvenience and loss through rats and mice are just as great, as some corn must be kept for seed and feed for cattle and sheep, if not for horses.
- 4th. Larger granaries must be erected to store corn
- 5th. What are men to do in winter?
- 6th. Is corn to be marketed at once or sold in a full and low market?
- 7th. What is to do the light horse work?

Would the motor-harvester enable us to compete against the foreigner? Because they would not be allowed to use one in their hot climate, large fields, and places where straw is of no value. I think the motor is one more pound on the poor "camel's" back. I know the motor, like the steam engine, has its uses, and so has the horse. The motor-cultivator may do all right in "Yankee-land," but how often can the soil be found in condition to allow for sowing same day as ploughed, and rolled? Besides, there is the irregularity of the field when ripening, as some corn will be sown one day and the other when you can. I trust some other practical man will take up the motor article more ably than I can.

In reply to the above and other criticisms on the value of the motor for harvesting, Mr. John Scott gives the comparative cost of working with horses and with the motor. The figures were supplied by a practical farmer who works 400 acres:—

INITIAL COST OF PLANT TO WORK A FARM OF 400 ACRES.

<i>Horses Plant.</i>				<i>Motor Cultivation Plant.</i>			
		£				£	
8 Horses and harness	...	...	400	1 Motor tractor	...	...	350
3 Wagons	...	...	75	3-Furrow plough attachment	...	...	25
3 Tip-carts	...	...	45	Cultivator and harrow attachments	...	...	35
4 Ploughs	...	...	20	Seed and manure drill and broadcasting attachments	...	...	30
1 Corn drill	...	...	36	Roller attachments	...	...	5
1 Root drill	...	...	36	Mowing, reaping, and binding attachments	...	...	40
2 Heavy drags	...	...	15	Haymaking and raking attachments	...	...	20
4 Light drags	...	...	16	2 Wagons	...	...	36
2 Cultivators	...	...	25	1 Tip-wagon	...	...	24
1 Plain roller	...	...	9				
1 Cambridge roller	...	...	12				
2 Double-horse hoes	...	...	15				
1 16-ft. broadcast sower	...	...	12				
1 Binder	...	...	35				
1 Mower	...	...	12				
Total	...	...	£763	Total	...	...	£560

As the horse estimate does not include a threshing machine, I have also omitted that item in the motor cultivator plant. Mr. Jack's horse plant costs: £1 18s. per acre; my motor plant costs £1 8s. per acre. This motor plant will do everything that the eight horses will do, including field work, road work, and farm work, &c., so that, as far as work is concerned, horses might be dispensed with altogether.

So much for the cost of purchasing. The comparative cost of maintenance and working has now to be considered, and will, I think, be fairly stated as follows:—

<i>Horse Cultivation.</i>		<i>Motor Cultivation.</i>	
	£		£ s. d.
5 per cent. on £400 in horses	20	5 per cent. interest on £350 in motor	17 10 0
10 per cent. wear and tear and depreciation in horses	40	15 per cent. wear and tear of motor	52 10 0
10 per cent. wear and tear and depreciation on £360 in implements	36	10 per cent. depreciation of motor	35 0 0
Keep of 8 horses at £18 each per annum	144	10 per cent. depreciation on £210 in implements	21 0 0
		Petrol and lubricating oil for 250 days' work	160 0 0
Total	£240	Total	£276 0 0

The eight horses work, say, 300 days a year, and cost 16s. a day.

The motor works, say, 250 days a year, and costs 22s. 1d. a day.

COMPARATIVE COST OF WORKING.

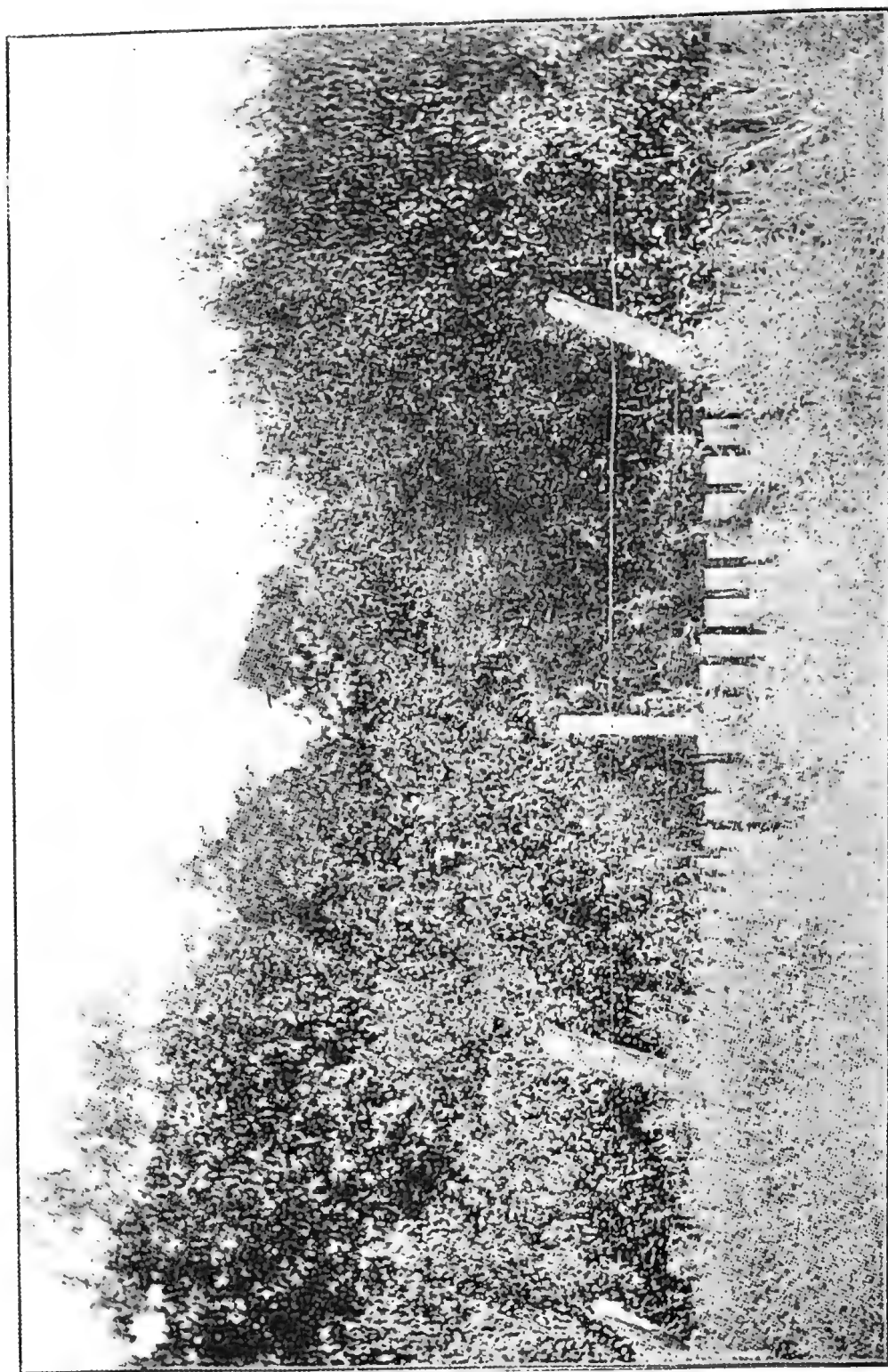
<i>Horse Cultivation.</i>		<i>Motor Cultivation.</i>	
(1 day's work of 8 horses=4 acres.)		(1 day's work of motor=8 acres.)	
	£ s. d.		£ s. d.
8 Horses 1 day cost	0 16 0	Motor 1 day costs	1 2 1
4 Men 1 day cost	0 12 0	1 Man 1 day costs	0 5 0
Total daily cost	1 8 0	Total daily cost	1 7 1
Cost per acre =	0 7 0	Cost per acre =	0 3 ½

In the comparative cost I make no allowance for profits on horse-breeding or horse-dealing. Such profits are exceptional in all cases where the horses are doing full work, and it is horses in full work that we are now considering. The horse as a unit of power can only be doubled, or trebled, or multiplied at a proportionate cost—exactly the same, neither more nor less—as motor power can be increased. The motor is capable of doing every description of work that the horse can do on the farm or elsewhere, and the whole of the work as easily as part of it; it has to be fed only when it works; and it can be started in less time than a horse can be harnessed and yoked.

Coming to harvesting operations, it is just because it is a question of climate that I advocate reaping and threshing at the same time. The fewer fine days there are at harvest-time, the more urgent it becomes to make the most of those there are, and get the grain into the granary without the loss of a day if possible. The straw, if tied in bundles, will not spoil if left on the field a week or two. But the grain must be cut dry, and, if possible, just when the "milk" has gone out of it. Early cutting is another fetish. Half the corn in this country is cut when quite green, and what is the result? The wheat grown in this country, as Mr. Stacey has recently shown, has, on the whole, become so poor in quality that millers cannot use it without a large admixture of imported wheat—or if they do use the English wheat alone, the flour from it does not command the sale it should do. With motor cultivation seeding will be finished earlier, and harvest will begin earlier, and will finish earlier, even if the corn is allowed a few more days to ripen.

Mr. Ford I do not take seriously. Southern farmers have sometimes been known to pay as much as 20s. an acre for cutting and stacking alone, and probably many of them have paid as much this year. Then there is the 5s. an acre for threshing in addition. A light crop is easily handled. Does Mr. Ford affirm that his outlay of 12s. 9d. per acre for harvesting and threshing is for a crop of 40 bushels an acre, the yield on which my estimates were based? His "weighty arguments" will dissolve if you look at them. The motor as "one more pound on the poor camel's back" is a fine touch of humour. But the crowning iniquity of the motor cultivator is "the irregularity of the field in ripening, as some corn will be sown one day, and the other when you can." Is all the corn ever sown in one day? or is it all

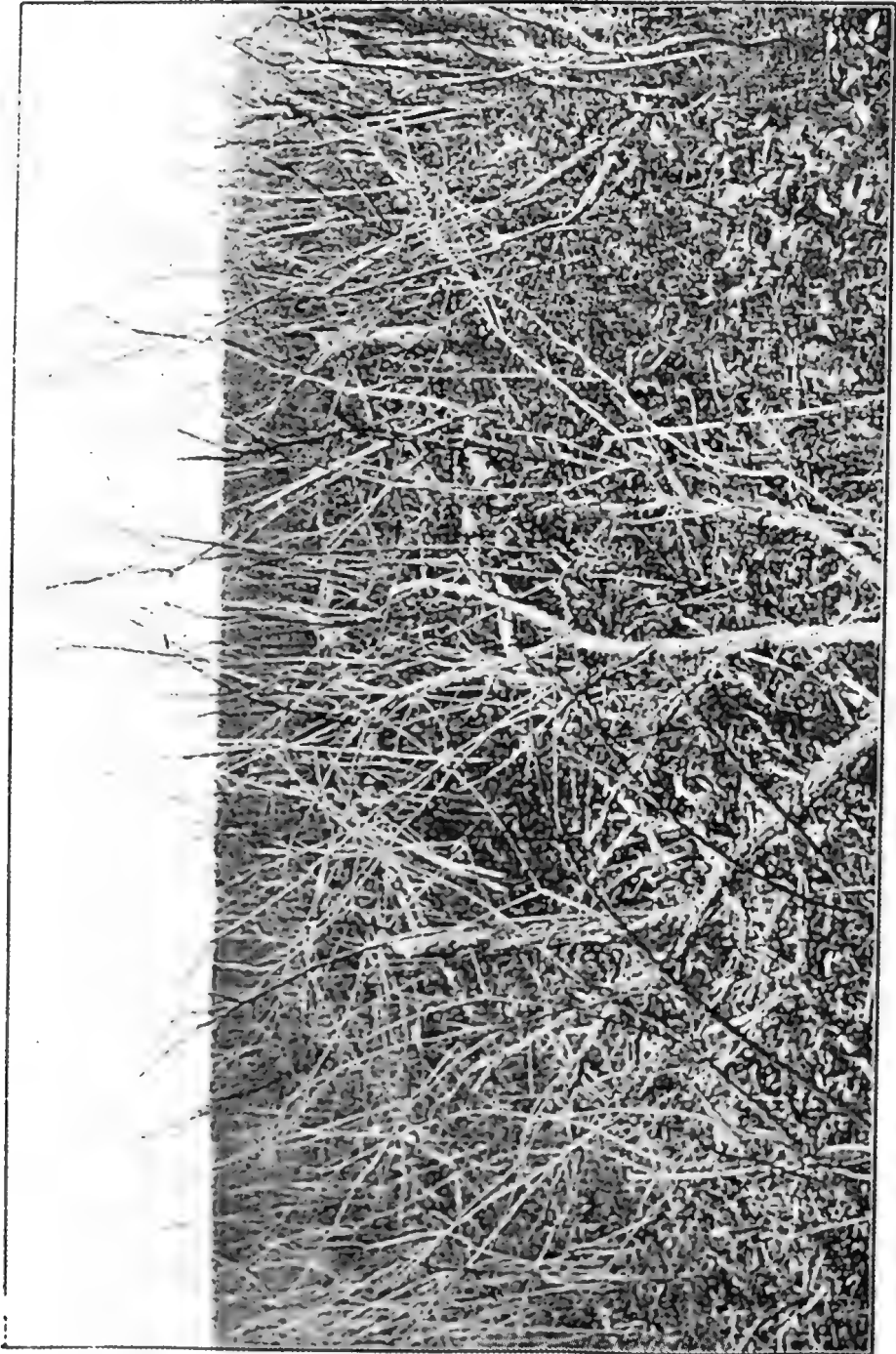
Plate VIII.



BRUSH LAND BEFORE GOATING.



Plate IX.



BRUSH LAND DURING GOATING, AFTER TWELVE MONTHS.

Plate X.



BUSH LAND AFTER GOATING. TWO YEARS.

reaped in one day? It is quite the other way. The motor-cultivator takes out its wheel tracks, it deposits the seed at an even depth, and there is no trampling after seeding; therefore, the irregularity of the field in ripening is an impossibility when so cultivated. But what happens in the ordinary way? After a field has been sown and rolled in spring, let Mr. Ford view, and count if he can, the horses' footmarks per acre. The injury done in this way is not so much the mere trampling, as that every footmark increases the inequality of the braird and of ripening, which causes a larger proportion of tail corn.

We have devoted so much space to this question of the employment of the motor in agricultural operations, in response to several requests which have reached us from correspondents for up-to-date information on the subjects. We must ask our correspondents to keep this number of the *Journal* for reference, as we shall not recur to the matter, unless some further interesting development takes place.

ANGORA GOATS.

The accompanying illustrations, which we take from a publication issued by the United States Department of Agriculture Bureau of Animal Industry, clearly show the value of the Angora as a brush cleaner. The first shows a dense mass of hazel, plum, crab-apple, several varieties of oaks and weeds as high as a fence. The second shows the same land while the goats were operating on it. It will be observed that the brush is dead, and that the weeds only appear to be alive. The third shows the "finished product," after two years, the land being now ready for cultivation or for pasture for sheep, cattle, or horses. Large areas of land in Queensland are so thickly overgrown with young wattle-trees, oaks, box, and undergrowth as to be utterly valueless for any purpose whatever, unless cleared at too great expense. If Angora goats were run on such country, the dense growth would rapidly disappear, and the land become available for fruit-growing or dairy-farming.

THE SCARCITY OF BINDER TWINE.

In consequence of the phenomenal crops of wheat and barley in 1903-4, the demand for binder twine has been very considerably in excess of the supply. In ordinary seasons the quantity of twine used during a harvest amounts to between 2½ and 3 lb. per acre. On this occasion 4 lb. and over have been used per acre. Taking the estimated area of wheat, &c., cut with the reaper and binder in all the States of the Commonwealth, it has been computed that the farmers have used nearly 3,000 tons of binder twine, on which, by the Federal tariff, a duty of £5 per ton is exacted. This duty alone raised the price of twine by £15,000. The average price of this indispensable article is 7d. per lb., duty, &c., paid, so that the total amount spent on this one item has been £196,000. It was expected, when the farmers had the duty imposed on them for twine, that it would be manufactured within the Commonwealth at a reasonable price, but the hope of cheap twine was not realised. There are two mills in Victoria, one in New South Wales, and one in South Australia, as against six in New Zealand, where binder twine is admitted duty free. It was the latter which enabled the farmers of Australia to get in their harvest. When it is considered that, in addition to the binders already in the various States, no less than 8,000 more were sold in the Commonwealth, it will be seen what an important matter is the manufacture and sale of binder twine.

Dairying.

DEHORNING BY CROSSING.

Humane persons who dislike the idea of dehorning cattle, on the ground that the process is painful and therefore cruel, will read with interest a letter which appeared in a report upon various breeds of polled cattle, issued by the secretary of the Kansas (U.S.A.) Department of Agriculture, written by a contributor, Mr. Myers, to the following effect:—

It was as far back as 1880 that I first heard much about dehorning cattle in our State, when a farmer, named Henry Haaff, had his cattle dehorned, and it raised such a howl that he was prosecuted for cruelty, but was acquitted by the court. Some thought that dehorning was not so painful as castrating; others thought it was; and still others thought as nature had adorned the cattle with horns it would be cruel to have them taken off. And so the talk went on, and the practice caught on. Dick Jones had his cattle dehorned, and lost only one; Peter Smith had his done, and lost two head; John Drayton had his cattle dehorned, and did not lose any. I began to think very seriously about having my own cattle dehorned, but, like many of my neighbours, felt that it would be barbarous; so I hesitated, but the more I watched the cattle feeding along the rack in the hayshed, and saw how they hooked and jammed each other around, the more favourably I thought of dehorning. I did not fully make up my mind until one day, when feeding the cattle in the shed, I watched the cussedness of an old cow, and saw how she bruised the other cattle, and that it was not safe for them to come nearer than 8 feet of her on either side, or they would be gored. Not being satisfied by occupying at least 16 feet of the shed, she would swoop down along the rack every few minutes to show them that she was the boss.

Then it was that I made up my mind to have my cattle dehorned, and when the early spring time came my cattle lost their horns very suddenly, but they did not come off without pain, because we did not then have the present scientific clippers, and had to use an ordinary saw. I did not lose any, but it was a long time before their heads healed up. It was about that time we began to have a good deal said about breeding the horns off. I had been reading about the Polled Angus being a breed that would cross with our common cattle, and, as good luck would have it, I happened to see a lot of black polls at the New Orleans Exhibition that looked to me as being of a good type, and just the kind of cattle to stand our cold winters. When I learned that they were the breed that would take off at least 98 per cent. of the horns in the first cross I made up my mind that I would get some as soon as I could. Upon arriving home I wrote to Mr. Norris, of Lamoille, asking him if he had any of his polled bulls for sale. In reply he said that he had six or eight full-bloods and one half-blood. I found them to be one of the finest lots of calves I had ever seen. I asked his lowest price. He said that the full-bloods were £40 each and the half-bloods £16. The price looked a little high, but a dehorner I was bound to have. I looked them over carefully, and the half-blood looked to be one of the best bulls in the lot, so I decided to take him and save my money, which was not large. I found the young bull to be a splendid breeder, and fully 60 per cent. of his get were black and hornless; then I began to think that I had struck what I was looking for, and, in justice to that half-blood, must say that he improved my cattle more than any high grade of full-blood shorthorns that I have ever used. I kept him for two years, and sold him for £14. The next bull used in my herd was a full-blood, purchased in the autumn of 1887. In the following spring I bought three imported cows.

I have not used any bull in my herd in the last thirteen years but a registered black poll, and I have made it a point to raise 25 or 30 calves each year for the last twenty-five years. Now, as to these cattle being the best dehorners. I have bred and raised more than 400 head of full-bloods and grades in the last thirteen years, and can truthfully say that not more than 2 or 3 per cent. of that large number have had horns. Perhaps the per cent. of hornless cattle is larger than it would have been had I used more of the common cattle, but I am fully satisfied from what I have seen and know of the black polls that the get of a pure-blood will be at least 97 per cent. hornless. That includes Jerseys, Ayrshires, Holsteins, and all the crosses. As a dehorner the black polled cattle are pre-eminently useful, while as money-makers generally they are second to none.

FORGE AHEAD.

If there are any dairy farmers in Australia who cling to the comfortable theory that dairy experts are too exacting in their requirements for perfecting methods for dairy farming and dairy produce manufacture, and that the old rule of thumb practices of their grandfathers and grandmothers are good enough for them, they should begin to lose heart, for in the race for the markets of the world only those who can keep abreast of the times can possibly reach the goal and make a profit when they get there.

There is as much difference in the quality of butter as there is in the quality of land and the soil on the land. When a dairy farmer views a block of land he examines the soil, the water, or prospects of a water supply, and he appraises its value accordingly. The dullest of dairy farmers knows perfectly well that all land is not of equal value, but somehow or other he gets it into his head that all cream, especially his own, is good and that it must of necessity make a first-class butter, no matter how neglectful he is of reasonable care to make it so. Such a frame of mind was well suited to the middle ages, when all sorts of fairies, witches, elves, and other imaginary beings were held responsible for the sourness of the milk and the rancidity of the butter, while the germs and dirt that were the real cause of the trouble were undreamed of and unheard of.

A healthy cow yields pure milk; many impurities that creep in come from the surroundings of the dairy. Dust or dirt in any form contains micro-organisms, generally injurious ones, and they feed on the milk, rendering it unfit for use as a good butter or cheese maker. The country that sends the butter to London and commands the highest price is Denmark, and there is no country in the world where modern conditions are more extensively in vogue on the farms and in the factories than that portion of Scandinavia. There are still farms possibly where the dung-heap is within smelling distance of the cowbails, and where the drainage is imperfect, but the bulk of the dairy farms follow up-to-date methods, and they make money accordingly.

The New Zealand Agricultural Department's new dairy expert is from Denmark; his name is Johannes Pedersen, and he comes south with the highest credentials.

Like our State dairy expert, Mr. M. A. O'Callaghan, he is a young man. Mr. Pedersen, who is only twenty-seven years old, started early in life to study the industry of butter-making, and has had a long and intimate acquaintance with the conditions under which dairying is carried on in Denmark. During the last eleven years he has been working in dairying in Denmark, and has also spent a year in France, and another in Holland. He has had some experience of the industry in Germany, and has some knowledge of how it is carried on in Siberia. Before leaving for New Zealand he was manager of a very large butter factory at Varde, a town in Denmark about half an hour's railway journey from Eshjberg, the seaport whence extensive consignments of butter are sent from Denmark to the London market.

It is not so much with the qualifications of Mr. Pedersen that we are concerned for the moment, as his remarks concerning Siberian dairy farmers and their butter on the London market. In regard to the competition from Siberia, Mr. Pedersen says that at present the butter sent from that country is not of the same standard as the Danish or New Zealand article, and is chiefly used for baking purposes. The quantity exported from Siberia to the London market, however, is increasing every year, and no doubt the standard ought to improve, especially in view of the generous assistance given by the Russian Government to the industry. The chief trouble appears to be that the Russian farmer is non-progressive, and is slow to take advantage of the latest methods in the manufacture of butter. The only butter-making season in Siberia practically is the summer, whereas in Denmark, so well are the Danish dairy farmers equipped for their work, the production is practically of the same volume in the winter as the summer, notwithstanding the severity of the winter weather. The Danish butter is carefully graded, and, as it was found that Dutch and Swedish butter was being sold in London as from Denmark, the Danish Government promptly took steps to stop such practices, and now every case of butter from Denmark must bear the Government stamp to indicate its quality as well as the country of its origin. In addition to this, there are numbers on the cases representing the factories in which the butter was manufactured.

Now, the part of that expression of opinion and statement of fact that we wish to more than passingly allude to is: The chief trouble appears to be that the Russian farmer is non-progressive and is slow to take advantage of the latest methods in the manufacture of butter. In that we see a reflection of some of our people in New South Wales; not many it is true, still there are some, and we must keep pointing out how necessary it is for them to "get a move on," so that they may get abreast of the Scandinavians and a long way ahead of the Siberians.

The other aspect of Mr. Pedersen's remarks that should be kept in mind is that of winter feeding and a winter export of butter. Our winters in Australia are summer compared to Denmark, and with hand feeding, rugging, and shelter export should go forward from the Commonwealth all the year round. Not in such volume perhaps as now, but in quantities sufficient to keep the market in South Africa and Great Britain intact.—*Station, Farm, and Garden.*

SELECTION AND CARE OF BROOD SOWS.

In selecting young sows to be kept for breeders, I always choose them from prolific litters, and from careful mothers, which have proved themselves good milkers. It is very important to have sows that will farrow good-sized litters. The sow that only farrows three or four pigs cannot be very profitable to the owner. It is not always possible to tell a gilt that will make a prolific mother. If she is too short and blocky, and inclined to keep very fat, only small litters can be expected.

Many farmers make a mistake by selecting the finest-looking pigs to breed from. They very often prove to be poor mothers and unprolific breeders. I select the most lengthy, well-proportioned pigs in the litter. I like for them to have square hips and shoulders, with good bone and muscle. Bone and muscle in the brood sow is better than too much fat. After selecting the pigs I intend to keep as breeders, I separate them from the rest of the herd, so I can feed them on bone and muscle forming foods.

KEEP SOWS IN GOOD FLESH.

It is very important that the food for the brood sow should produce bone and muscle, and not too much fat. I like to keep the sows in good flesh, but it is not advisable to feed them on corn altogether, as it produces too much

fat, and leaves the bone and muscle in a weakened and undeveloped condition. The food that is best for the development of the sow is also best adapted for the growth of the pigs which she carries.

TWO LITTERS A YEAR.

I usually get two litters a year from each sow. There are some pig-raisers who object to this, but it seems to me that the advantages of raising two litters a year outnumber the disadvantages. To obtain the best success in swine-breeding, we must breed from mature stock, and if we raise but one litter a year the cost of maintaining the sows during the idle part of the season will very greatly reduce the profits. By keeping old and tried sows, raising two litters, I am able to obtain good, strong pigs that will resist disease better than those from immature breeding stock.

When the sow is to raise two litters a year, it requires more care and attention to keep her in proper condition to bring forth her young, and properly care for them after they have been farrowed. It is perfectly natural for a sow to lose in flesh while suckling her litter. So, if she is to be bred again as soon as they are weaned, it is necessary to keep her in as good flesh as possible, since she will not have the time to gain flesh again that the sow does which only brings one litter a year. My experience has always been that the extra litter pays many times for the extra care and trouble required to produce them. I keep a record of the time of breeding, so I will know exactly when to expect the litter. This is very easy to do, by counting 114 days from date of breeding.

PIG PADDOCKS AND HOUSES.

I have separate paddocks, containing about 1 acre, and a small house, 7 by 8 feet, with dirt floor. I prefer dirt floor, as it absorbs dampness, as well as prevents any currents of air passing under the floor, as it will do under a plank floor. These houses are placed on runners, so they can be moved about from place to place, as necessary. If the weather is very cold, the dirt can be banked up around the edges, thus shutting off any currents of air. Pigs may be farrowed in these houses during very cold weather without danger from cold. In warm weather I use an open shed, placed in a cool place, instead of house.

SOW BEFORE AND DURING FARROWING TIME.

About ten days before farrowing time I separate the sows from the herd, placing them in these lots. Put in plenty of short bedding. I use forest leaves, as I think they make the most perfect bed. If leaves cannot be had, straw will do very well. Give the sow plenty of feed while she is shut up, but feed very little, if any, corn. I feed chopped wheat, bran, and shorts, and any kind of cooling food.

When the sow farrows, do not give her anything to eat or drink for 24 hours, except some good fresh water; and be sure it is not too cold. Ice cold water is very injurious, and liable to cause the loss of the entire litter.

AFTER FARROWING.

From farrowing time until the pigs are about a month old is a very critical period with the brood sow and her litter, requiring a great deal of skill and good judgment to pull them through in perfect condition.

After 24 hours I give the sow a light feed of bran and shorts, made into a thin slop. It is necessary to be very careful about overfeeding for two or three weeks. Overfeeding, too much maize, and greasy or sour slops will give the pigs the scours, and be most sure to kill some of them. I gradually increase the feed until I get the sow on full feed in two or three weeks from date of farrowing. After that there is not much danger from overfeeding. The feed may consist of one-third or one-half maize, if desired. I have a windmill and feed-grinder, chopping my own maize and wheat. I mix the chopped maize

and wheat half-and-half, which makes an excellent feed. I never feed all they will eat of chops, as it is easy to feed too much, and get them so they will not eat it. I think it better to give less chops than they will eat, finishing with maize.

Keep beds cleaned out about twice a week, and free from dust. As soon as the pigs are two or three weeks old I place a small trough where the sow cannot reach it. By putting a small amount of chopped wheat in this when you feed the sow, they will soon learn to eat, and by the time they are six or eight weeks old will be eating nicely and ready to wean, and free from dust.—By T. J. Foster, in the *American Agriculturist*.

CURE FOR SWINE FEVER.

Ons Land, a South African newspaper, has it on the authority of a correspondent that seventeen out of eighteen pigs which were infected with swine fever have been cured by dosing them with a mixture of paraffin, turpentine, and raw linseed oil, in equal quantities of one tablespoonful each.

FEEDING TO PRODUCE FIRM BACON.

At the Guelph Agricultural Experimental Station, in Canada, experiments have been conducted with a view to determine the influence of several kinds of food and exercise on the production of firm bacon, and the following conclusions were arrived at:—

Exclusive maize-feeding for a somewhat extended period produced bacon of an extremely soft and undesirable character. No evil effects were noted from its use when fed in finishing pigs that had had plenty of exercise until they had reached about 100 lb. live weight, or had been fed skim milk with a mixed grain ration until they had reached 100 lb. live weight. Pigs confined in pens and fed wheat middlings during the early stages of growth, and finished off on peas, barley, and shorts, had a marked tendency towards softness. When these same foods were given, but the pigs allowed to have plenty of exercise, much firmer bacon was produced. The evil effects of lack of exercise were largely overcome by the use of skim milk and whey. From 2 lb. to 2½ lb. of whey is recommended for each lb. of grain fed.

Barley alone has given good gains and exceptionally fine bacon. Peameal alone resulted in unthrifty animals and poor gains; but, when mixed with middlings in the proportion of 3 parts peameal to 1 part middlings, good gains and an excellent quality of bacon were produced. It is recommended that peas always be fed in combination with other grains for pigs. "A two-thirds ration of barley, with all the rape the pig would eat, followed by about three weeks' exclusive barley feeding at the close, gave economical gains on the whole, and produced bacon of good quality, though scarcely so firm as that produced by barley or by peas and middlings. Barley appears to be an exceptionally safe and valuable food for swine, whether fed alone or in combination with other feeds." The college experiments have also brought out the fact that "unthrifty pigs are more likely to produce soft bacon than growthy, well-fed pigs." The feeding of roots with the grain rations has not injuriously affected the quality of bacon produced. When equal weights of roots and meal were fed together the pigs made more rapid and economical gains than when meal alone was fed, and the bacon produced was superior in quality. This and many earlier experiments at the college show that succulent foods, whether roots or green feeds, tend to keep animals thrifty, and, therefore, produce firm bacon. The amount to use is about equal weights of succulent food and grain.

NUT-GRASS FOR PIGS.

We were lately discussing the demerits of nut-grass with a farmer, who ridiculed the idea of pigs thriving on the bulbs of nut-grass. He maintained that the so-called nut was a mere hard, wooden bulb, with no nourishment whatever in it. Pigs, he said, put upon nut-grass and nothing else, would starve to death in a month. We now get a surprise from Florida, U.S.A., the land of surprises. This is what the *Florida Agriculturist* has to say about the nut-grass:—

The nut-grass has long been to the southern farmer the synonym of detestable things in his field, a plant which he would dismount and fox-hunt to dig out with his pocket-knife. But it triumphed over him all the same, and took possession of his field. Some farmers hated it so intensely that they were about ready to sell out and move to Texas when the nut-grass got possession.

Now, comes the latter-day Florida farmer, who was born without any prepossessions in his blood one way or the other towards nut-grass, and pronounces it a thing not altogether bad—yes, even good.

Mayor C. W. Campbell, of Ocala, one of the most practical farmers and prolific farm writers the State has ever seen, used to champion the hated nut-grass. To young farmers writing to him to ask how to eradicate it, he would reply, "What do you want to get rid of nut-grass for? It is the best natural hog forage you have on your farm."

This seemed to be the actual fact. We have not at hand the chemical analysis of the bulb, but the best analysis is the testimony of the hog. A band of hogs with only one-half improved blood in their veins, turned into an old, abandoned field, will root nut-grass all summer and gain 50 to 80 lb. apiece by the end of October. Then finish them off with a light daily feed of corn for a couple of weeks, to harden their fat and flavour their flesh, and you will have the cheapest and best bacon you could make.

The hogs plant one bulb, or half a dozen for every one they consume. It is ineradicable, self-planted, self-perpetuated, self-cultivated. It is one of Nature's best provisions for the "lazy Floridians." The bulb is small, sweet, nutty, rich. The exercise of rooting for it gives the hog just that delicious blend of fat and lean which makes the perfect bacon—not a mass of fat such as the 4-inch pork we buy from the north and absorb into our blood to give us "risings" or boils all summer.

Even on the Stetson farms at De-Land, where the best up-to-date methods prevail, nut-grass is accepted as an invaluable factor in farm management. "Old fields" are fenced hog-tight for no other purpose but to be used as a hog-range; it is considered one of the best investments on the estate.

[It is a pity that the *Agriculturist* has not given the botanical name of the nut-grass here mentioned, as we have two kinds in Queensland. One is the very troublesome, ineradicable plant of the coast (*Cyperus rotundus*). The other grows on the blacksoil of the Darling Downs, and is easily got rid of; it is botanically known as *Cyperus esculentus*. Mr. F. M. Bailey, Colonial Botanist, says that both afford good nourishment for pigs.—Ed. *Q.A.J.*]

A FAMOUS HEREFORD BULL.

Dale, a famous showyard Hereford bull, whose name is a household word in American Hereford circles, has died. In the showyard and in the sale ring he has created more than one sensation, and his last owner's claim that he had left more champion showyard Herefords than any bull living or dead, though a big order, is probably true. He changed hands three times—in the first case for just over £200. Later, after he had carried everything before him for a number of years against all ages and all breeds, he was sold by auction at £1,600. When over five years old he was sold for £2,000.—*Exchange.*

DAIRYING AT DUGANDAN.

We have received from Mr. J. Hardcastle the subjoined records of milk and butter from the six cows shown in our illustration last month for November and December, together with the results for three months, including October. In the latter report, the average per cow is given as 13.14 lb. of milk. It should have been 1.314. The cow named Cicely is an Illawarra cow. We regret to hear that want of rain is being severely felt in the district. Only 1½ inches of rain were recorded for the months of November and December. As a consequence, the pasture has dried up very much, and all the cows have gone down in their milk yield. "If rain does not fall soon," says Mr. Hardcastle (writing under date 12th January), "we shall be obliged to cut down the corn now cobbing to prevent the supply falling too low."

MILK AND BUTTER RECORDS.

NOVEMBER.

Name.	Age.	Lb. Milk.	Test.	Lb. Butter.
Diamond Jubilee	8½	1,319	4.2	58.88
Cicely	5	1,183	3.3	42.5
Gem	5	1,170	3.3	42.4
Whitelegs	10	975	4.1	44.52
Duchess	5	963	3.8	40.63
Fancy	8	922	3.5	36.23

DECEMBER.

Diamond Jubilee ... ..	...	932	4.5	46.83
Cicely ... ..	...	983	3.4	37
Gem ... ..	...	973	3.4	36.44
Whitelegs ... ..	...	810	4.2	36.16
Duchess ... ..	...	808	3.9	35
Fancy ... ..	...	754	3.6	30

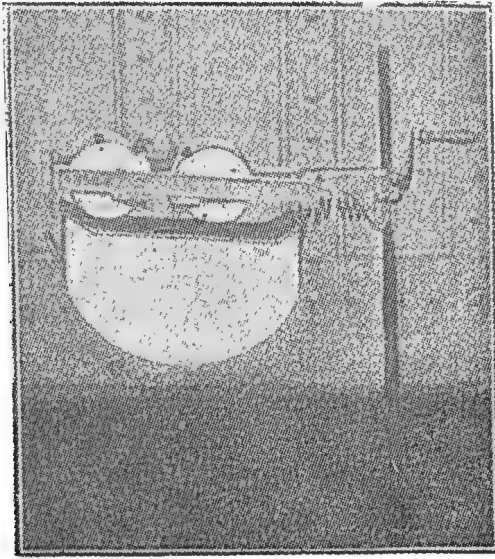
GRAND TOTALS FOR THREE MONTHS.

Diamond Jubilee ... ..	...	4,010	...	179.71
Cicely ... ..	...	3,550	...	131.30
Gem ... ..	...	3,476	...	127.14
Whitelegs ... ..	...	2,920	...	131.08
Duchess ... ..	...	2,916	...	122.63
Fancy ... ..	...	2,804	...	107.03
		19,676		798.89

AN INGENIOUS HAND-MILKING MACHINE.

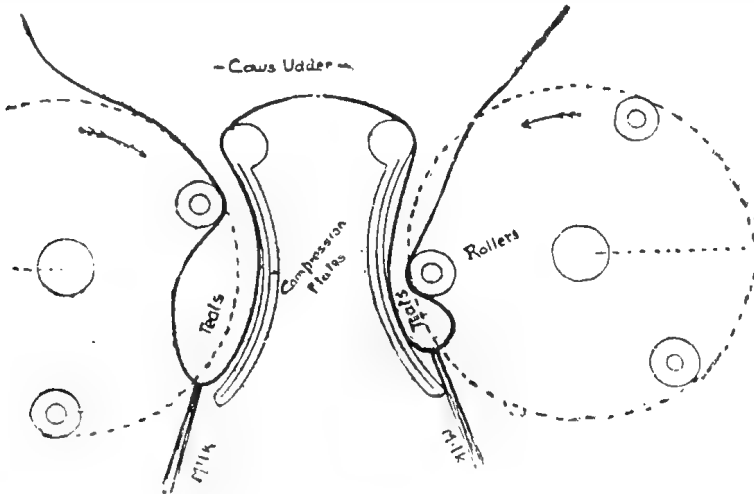
One of the ingenious new machines brought out to supplant manual labour, exhibited at the Dairy Show, was a hand-milking machine, the invention of Mr. C. S. Padfield, Hemington, Bath. We reproduce a photograph and a diagram, which illustrates the method of working adopted for this machine. It is, in a sense, simplicity itself. The machine is put under the cow on the right-hand side, the stand and handles being beside the cow. In adjusting to the required height, the plates come up in the middle of the udder, and the teats drop outside of them. By turning the handle the rollers, as they come round in the direction indicated by the arrows, draw the teats against the compression plates, and the downward rolling pressure of the rollers, in

conjunction with the resistance offered by the plates, flattens the teats, and causes the milk to flow into the pail provided. The compression plates are provided with safety springs, and covered with rubber, and the rollers are rubber-covered. The space between the rollers and the plates can be adjusted



THE NEW MILKING MACHINE.

for large or small teats, and the other parts can be instantly adjusted to fit the cow. The machine milks all four teats of the cow at once, weighs only 28 lb. complete with stand and pail; pail holds 3 gallons. Machine requires no fixing, can be easily washed in a tub of water; milks the cow dry; the milk is clean, as the hands need not touch the teats, and there are no pipes for the milk to



SECTIONAL VIEW OF MILKING MACHINE.

run into and get tainted. It does not suck or rub the teats. The working parts are made of aluminium; combining lightness with strength and durability. The price complete, packed and delivered, is £7 10s.—*Farmer and Stockbreeder*.

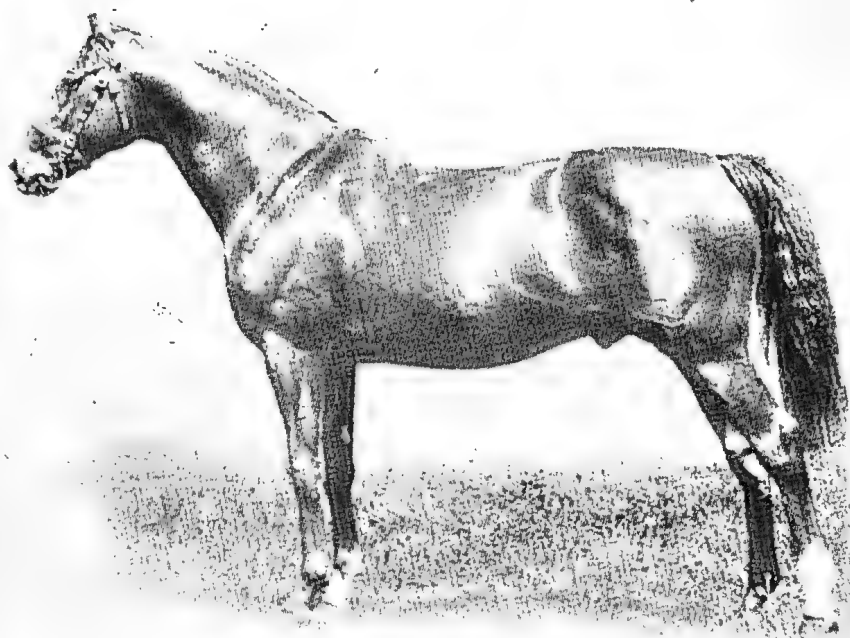
The Horse.

THE RACECOURSE IN CONNECTION WITH THE THOROUGHBRED.

By ERNEST A. SMITH.

Since writing last month on "The Queensland Saddle Horse, and How to Breed Him," there has come from England the rather startling information that the Royal Commission whose duty it is to see to the proper distribution of the King's Premiums, have turned over a new leaf—a leaf, by the way, of the Racing Calendar—which they are about to present to their judges of prospective hunter sires. It is, that performances on the turf of all candidates are to be furnished to the judges, and are to be taken into consideration by them in their selection of premium stallions. Now that the Royal Commissioners have led the way, the committees of all English agricultural shows are likely to follow suit. It is not so long ago that, not only in Queensland, but also at the metropolitan shows of Melbourne and Sydney, the pedigrees of the thoroughbreds were as a closed book. I was judging at both places in Jubilee year. There were three judges at each place, and, fortunately, the individuality, and consequently the pedigree, of the candidates became no secret. In this case, performances were also pretty well known, but in Queensland it has often happened that the judge or judges have gone simply by conformation, and have certainly taken no account whatever of the crucial test of the racecourse. I may take the defeat of that good performer, Antares, by Elected, at the Brisbane Exhibition of 1902, as a case in point. Unfortunately, with a great many worthy people, the racecourse and the racehorse are *anathema maranetha*, and thus the real value of the turf as an institution is often lost sight of. The abuses which undoubtedly exist have nothing whatever to do with the fact that the racecourse affords the only practical medium for testing the quality of a horse, which it certainly does most thoroughly. Though, of course, what a horse has done on the turf is not the only consideration when selecting a sire, it is by no means an unimportant one. It is obvious that pedigrees and performances of thoroughbred stallions are very important considerations. Certain strains of blood are famous for stoutness; others, again, for jumping, and so on; and, other things being equal or nearly so, such facts ought to count in the show ring, as they undoubtedly do count when a man is selecting a sire to mate his mares with. It is not so much that a horse has won races that is the important question. It is more to the point that he has stood the wear and training for some seasons. Patched-up horses that have broken down as two-year-olds are scarcely likely to make satisfactory sires. Again, the particulars of the performances furnished will, of themselves, tell their own tale. A horse that has been prominent in short-distance races is hardly likely to turn out as good a sire as a long-distance stayer; though, curiously enough, there have been known instances of the reverse being the case. Again, long-distance races of one and a-half miles and two miles are seldom won except by a good horse.

At the Downs Picnic race meeting, held at Toowoomba on the 1st and 2nd of this month, many of the competitors were of a most serviceable class, being well bred, well shaped, sound, and able to stand the test of distance and heavy weights in addition. In the principal event, the Ladies' Bracelet, the winner, Pearl, an aged mare by Archie out of Burrandilla, carried the decent load of 11 st. 2 lb., and ran the distance in wonderfully good time; the second horse was Spartan, a four-year-old gelding by Valiant, who carried 10 st. 3 lb., while the other competitors were of an equally high class. In the Vacy Stakes, a handicap for grassfeds, Whisper, a four-year-old gelding by Yabba, ran a mile in the excellent time of 1 min. 48½ sec. Whisper carried 10 st. 10 lb., and Yabbanda, a six-year-old mare, also by Yabba, carried the respectable load of 12 st. 7 lb. into second place. Among the mares racing at this meeting there were several who would admirably form the nucleus of a stud from which to breed horses suitable for the best class of remounts. It is this particular trade in remounts that



Cyllene, by Bonarista—Arcadia (at Hardwick Stud Farm, Pangbourne).



Ayrs' ire, by Hampton—Atalanta (at Egerton Stud, Newmarket.)

it is desirable to capture for Queensland, and now that, as a result of the South African war, the eyes of the Remount Authorities have been opened to the value of blood as opposed to mere size and symmetry, it is all the more necessary for us to breed the animal most suited to their requirements. This is, after all, only business. The severe lesson taught the British military authorities in the Boer war will not be forgotten in a hurry. The Boer pony is said to be anything but a beauty to look at, but all the same it was good enough to carry 16 st. men and outpace and outwork the beautiful 60-guinea hackney and Cleveland Bay chargers of the Lancers and Dragoons opposed to them in the early part of the war. The reason is, that these Boer ponies had a strong foundation of thoroughbred blood in them. About fifty years ago, Lord Charles Somerset introduced a large number of thoroughbreds into Cape Colony, and it is from his importations that the majority of the Boer saddle horses descend. Between the years of 1840 and 1856, over a hundred thoroughbred stallions, sound and unsound, were landed at the Cape. Though imported for racing purposes, the effect of these sires on the general horse stock of the colony was remarkable, and the late Sir Walter Gilbert bore high testimony to the style in which the Dragoon Guards, weighing on the average 20 st. with equipment, were carried through long marches by the half-bred sons of these thoroughbreds. Since that time, there have not been nearly so many good horses imported, while the Boers are generally more solicitous about small pointed ears, a pretty head, and peacocky carriage; legs and feet, strength and substance, being minor considerations. It is from these equine outcasts the Boer pony descends, but it has degenerated in size, from various causes, such as lack of good pasture, careless crossing, and the stoppage of regular importations to keep up the standard; but, compared to the highly-fed hackney and Cleveland Bay, they were vitality itself. Even after fifty years of careless breeding and semi-starvation, the vitality inherited from their forbears rendered them far superior to the best hackney in existence.

The value of the English thoroughbred, when a first-class performer on the turf, is well known by the Continental nations, who spare no expense in getting hold of the very best. The enormous sum of £20,000 paid by the German Government for Rock Sand, the winner of the Two Thousand Guineas, Derby, and Leger, and thus, unquestionably, the best of his year, is still fresh in our memories; and it may be noted that such expensive animals are not purchased for racing, but for the improvement of the breed of horses, particularly those for military purposes. An altogether erroneous impression prevails among many persons that the thoroughbred sires most successful on the racecourse are unsuited for the improvement of the saddle horse. The exact contrary is the case, and one has only to look at the illustrations given on another page to see power, shape, and make fully exemplified. Cyllene, an Ascot Gold Cup winner, is a particularly fine thoroughbred of size, bone, and substance. Ayrshire, bred by the Duke of Portland, is a Two Thousand and Derby winner, and is another fine specimen of the thoroughbred, and these two types plainly show that the very best breeding and the highest racing attributes are far from being incompatible with size, strength, and conformation. With war likely to be declared between Russia and Japan before these lines are in print, all these matters in connection with the improvement of our horses assume an urgency which can hardly be ignored. In the event of Russia overpowering Japan, and thus bringing England into the struggle, there will immediately be a great demand for remounts from India. Will Queensland be, as now, unprepared to take her part in supplying the demand with horses that will do her credit; or will it, as before, be left to dealers to purchase and resell buckjumpers and scrubbers to inflict more damage on our reputation, and again lose the chance of a most remunerative trade for our horsebreeders?

[In our last issue we omitted to credit Mr. Smith with the authorship of the article on "The Queensland Saddle Horse, and How to Breed Him."—Ed. Q.A.J.]

Poultry.

BRITISH POULTRY IN SOUTH AFRICA.

Queensland farmers and others who are "on the land" have not yet become seized of the fact that in all countries where attention is given to the rearing of poultry and the export of frozen poultry and of eggs, the industry, from a financial point of view, far exceeds in value any other industry. Take the United States of America as an example:—

As far back as 1896, there were 350,000,000 chickens of all ages, and 35,000,000 poultry of other kinds. The number of eggs produced was 13,200,000,000, of a value of £33,000,000. The value of the dressed poultry was £25,000,000, or a total of £58,000,000. Let us now compare these earnings of the poultry with what was realised from other sources of revenue:—

Earnings of poultry	£58,000,000
Total value of gold, silver, wool, and sheep for the same year	44,486,836
Value of cotton crop	51,832,928
Value of wheat crop	47,587,799
Value of swine	37,305,949
Value of oat crop	32,731,313
Value of potato crop	15,796,980
Value of tobacco crop	7,114,845

It is thus easily seen that the poultry far outstrips all other sources of revenue.

To put it another way: The year's earnings of the poultry would have bought all the milch cows in America, and leave over £5,000,000 to spare; or, to put it still another way, the earnings of the poultry would have bought up all the gold, silver, wool, and sheep produced in the year, with the tobacco crop thrown in, and still there would have been nearly $6\frac{1}{2}$ million sovereigns left for some other speculation.

This year probably thousands of bushels of shed grain have been left in the Queensland wheat fields in consequence of storms and the tangled state of many fields of wheat. How many thousands of poultry would this waste have fattened for market? How many thousands of eggs would it not have been the means of producing?

The poultry trade of Russia produces nearly £5,000,000 per annum; her egg export alone amounting to 1,800,000 eggs. Egypt exports, in round numbers, 59,000,000 eggs. Russian Poland sends annually 3,000,000 geese to Germany.

Now, according to the *Mark Lane Express*, there would appear to be a good opening in South Africa for a large export of poultry and eggs from Australia to that country.

The imports of frozen poultry into Cape Colony for 1902 show a marked increase on those for 1901, and no country has participated in that increase to the same extent as the United Kingdom, which now tops the list.

The following is a comparative statement of the imports for 1901-2:—

Country whence imported.				Value.	
United Kingdom	...	...	£3,379	...	£10,038
New South Wales	...	...	2,606	...	3,058
Queensland	...	...	3	...	485
New Zealand	...	...	109	...	284
South Australia	...	...	—	...	172
Victoria	...	...	7,376	...	8,254
Natal	...	...	—	...	385
Argentine Republic	...	...	—	...	714
Tasmania	...	...	—	...	6
Canada	...	...	—	...	215
				£13,473	£23,614

This is a very fair increase, but it is small as compared with that of Natal, the value of whose imports for the year 1901 was £17,720, but for the nine months ending 30th September, 1902 (the latest return available), they amounted to the considerable sum of £44,656. It is impossible at present to secure the returns of the Transvaal, as in that colony and Orange River Colony the classification is different, poultry being included with meat, but there is no doubt whatever that they will show an even higher increase than Natal, especially the Transvaal, as Johannesburg is recognised as a big market for poultry and game of all kinds.

These returns, such as they are, indicate clearly enough that the African trade in poultry is at present one of considerable dimensions, and is rapidly increasing. The noticeable feature of the figures is that Victoria, which, in 1901, was at the top of the list, with a trade more than double that of the United Kingdom, which was next highest, is now second on the list, although showing an increase of trade equal to about 12 per cent., as against the big increase of the United Kingdom of over 200 per cent. This reversal of positions is very satisfactory, especially as it is attributed to the superior quality and better value obtained from Great Britain.

It must be understood, however, that the increase in our imports does not represent English-bred poultry; it is mostly Russian, shipped by English firms. The Russian poultry is unquestionably the most popular in the African market at the present time, and anyone not biased must admit deservedly so.

The reasons are plain and unmistakable. In the first place, it is obvious the birds have been bred and fed specially for export, as they proclaim great equality in size and weight, which average just about 3 lb. each. They are mostly small-framed birds, and at this weight are plump and fleshy. They are also plucked with evident care, all feathers and stubble and every particle of down possible being removed. They are neatly trussed with the head and neck wrapped in white paper and tucked under the right wing.

When killing they make a deep incision in the neck, close to the head, after dislocation of the neck, which promotes thorough bleeding, and accounts for the clean, white, and attractive appearance of the flesh. They have a high reputation for tenderness and flavour when cooked. Some shipments of Russian fowls were packed in cases containing 100 birds, but this is too big, as many of the retailers have very limited cool chamber accommodation; consequently a big risk of loss was taken by buying a full case of 100. To meet this objection, the cold storage companies had to open cases and take therefrom whatever quantity was required by the client. This meant a lot of handling and the risk of depreciation. They have, therefore, in their recent shipments been packing in smaller cases of 12 and 24 birds each. These cases are made of heavier timber. Each case has five 1-inch auger holes at each end, which allow ample ventilation. These holes are covered inside the case with a fine mesh

wire gauze, which, whilst not retarding the current of air, prevents the intrusion of vermin, insects, and dirt.

In the English packing, which is considered the best, there are 18, 20, 22, or 24 birds each in small square cases, which are strong, and protected in the way above described. These birds are also very cleanly plucked and carefully packed, each is wrapped in a light brown or buff coloured paper, but this feature I do not like, nor is it appreciated in the trade, as, when thawing, the paper clings to the fowl and cannot be easily removed, thus giving the bird an unattractive appearance that depreciates it in the eyes of buyers.

GUINEA FOWLS.

It is generally considered that the Guinea Fowl (*Numida meleagris*) originally came from West Africa. From "Wright's Book of Poultry" it would appear that the bird was known to the Romans, but, as the latter had scarcely any intercourse with Western Africa, the variety they knew came probably from Abyssinia. The domestic guinea fowl can hardly be considered profitable poultry. It is fond of straying away and laying in distant secret places. It also is very pugnacious, and has a habit of beating other poultry. It is quite hopeless to commence a stock with adult birds, for, directly they are at liberty, they are off, and never return again. But by setting eggs under common hens, and rearing them at home, they grow up much tamer, and when reared kindly and secluded nests are provided, they will generally lay in the house, and if perches are placed very high they can be induced to roost at home. As far as paying is concerned, Wright says:—So far domesticated, they will pay to rear, in places where they can have ample range, for their flesh alone, which is most delicious, resembling that of the pheasant. The hen lays from 60 to 100 eggs per annum, the eggs being rather small, pointed at the end, and of a dark cream colour. These eggs are of excellent flavour. The hen seldom sits until towards the end of summer, when chicks are always somewhat difficult to rear. Hence it is advisable to set the eggs earlier under common hens. The period of incubation is generally twenty-six days, not twenty-eight as has been stated. If the eggs are removed daily during the hen's absence, leaving one for a nestegg, she will not forsake the nest; but if a number are allowed to accumulate, and they are then removed, she will seek another spot, and conceal the second nest carefully. The chickens are said to be very delicate, but this arises from the smallness of their crops, which will not contain enough food to last them nearly as long as those of other chicks do. Hence, they need feeding *every half-hour*, and if thus treated they may be reared almost as easily as turkeys. They grow fast, and ordinary chicken diet suits them, but they require rather more animal food in the shape of chopped eggs and cooked meat. The chicks have amazingly thick and strong legs, and "paddle their own canoe" at a very early age. The adult guinea fowl weighs from 3 lb. to 4 lb. Although guinea fowls always run in pairs, two hens may safely be allowed to one cock when in captivity. With more than this the result is doubtful. As to sex, cock birds may be distinguished by their arching their backs and mincing along on tip-toe. They are also more spiteful to other poultry than the hens. Another mark of sex is, that the wattles of the male are larger than those of the female and rather differently placed. The treatment of guinea fowls is much the same as that of turkeys.

Mrs. Lance Rawson, in her bulletin on "Practical Poultry Farming," says:—"They are not worth keeping among other poultry. They are good layers certainly, but the eggs are very small, and the birds, unless killed quite young, are not worth eating, the flesh being exceptionally dry. From five to eight months is the limit of age for killing. I would not advise the practical poultry-farmer to breed them. They are pretty to look at, but are not profitable in themselves, and they are a constant worry to the laying hens. I had a flock of seventy at one time, and never made a shilling by them."

BREEDING GEESE FOR "FOIE GRAS."

There is not a special breed of geese used in Alsace for fattening for "foie gras," although the best for the purpose are the large variety known by the name of "oies cygnes." The duck is very little used. The birds are hatched in the spring, and by August are ready for fattening; they are never kept from one year to another only for breeding purposes.

Until the time for fattening, the geese are allowed to be in the farmyard, and are led from time to time to the fields and brooks; they are then put in cases which fit them closely, and shut in with bars which are just wide enough for them to put their heads through to reach some drinking water which is placed within their reach. It is essential that the place where they are kept should be well ventilated, lighted, and perfectly clean.

The birds are crammed two or three times a day, at the rate of $1\frac{1}{2}$ lb. per day, with maize and beans cooked in water. The rations should be increased as the appetite grows. The water placed within reach should be renewed at least every day; some farmers put a pinch of wood charcoal in it.

The fattening period lasts from four to five weeks, and some even feed until the sixth. They usually tell by the weight and feel of the birds when they are ready to be killed, and by long practice it will be found that there is a difficulty in breathing and the appearance of balls of fat under the wings. The "foie gras" obtained from Alsace is considered to be the finest in quality and delicacy, but Austro-Hungary supplies a large quantity, and in certain parts the raising of geese for this purpose is carried on all the year round.

TO TELL THE AGE OF FOWLS.

In reply to a correspondent of the *Agricultural Gazette* of Tasmania, the editor says:—In the case of young birds, the skin of the claw is supple, and the scales are thin and brilliant; if older birds, the skin is coarse and strong, and the nail of the last toe very much worn. Further, in the case of young poultry, the down underneath the wings is long, soft, and distributed over the surface of the skin with a good deal of regularity. Small blue veins are also discernible upon the skin, which is both delicate and rose-coloured. A bird aged more than one year has no more down, nor are the small veins perceptible under the skin, for the simple reason that the latter has become dry, devoid of lustre, thus recalling the appearance of flour. But this is only an aid in distinguishing between birds under and over a year old. An old hen can be judged chiefly by her eyelids, which are more shrivelled than those of younger fowls if compared with them. A more obvious distinction is in the feet, the toes being longer and more worn. An old hen also develops a spur, the scales of her shanks are harder and duller-looking than a young hen's.

PRESERVING EGGS.

The Ontario Department of Agriculture have published the following note of the results of experiments in egg preservation which were made at the Ontario Agricultural College last year:—

Several methods of preserving eggs were tested in our Poultry Department during the past year. The eggs for this purpose were taken early in June, and were tested in December. Many of the same methods that proved fairly successful in previous years were again tried.

Method No. 1.—A solution composed of 1 part water glass (*Sodium silicate*), and 5 parts water that had been previously boiled. This was a very strong solution, and unless an egg was absolutely fresh it would not sink in the solution.

The eggs from this solution were of fairly good flavour, and all were well preserved.

Method No. 2.—This was similar to No. 1, except that 8 parts of water were used instead of 5 parts. The eggs in this were nearly as good as those in No. 1. This is a good preservative where it is desired to keep summer eggs for winter use.

Method No. 3.—This was composed of 10 parts of water to 1 part of water glass. There were no bad eggs in this solution, but the eggs were inferior in flavour and in poaching quality to those kept by methods No. 1 and No. 2.

Method No. 4.—This consisted of the same solution as No. 2, but in place of allowing the eggs to remain in the liquid, they were removed after having been in it for a week, except the last lot which was put into the solution. This lot was left in the solution for the remainder of the season.

(a) The eggs, after being in the solution for a week, were removed and placed in an ordinary egg case in the cellar. They were all good when tested, but had evaporated considerably, and were lacking in flavour.

(b) These were the second lot of eggs to be placed in the liquid. They were handled similarly to those in (a), and were about equal quality.

(c) These eggs were allowed to remain in liquid. They were well preserved, all being good.

They were scarcely equal in quality to those from No. 2 method, and were superior to those from No. 3.

Method No. 5.—A lime solution made as follows:—Two pounds wash lime were slacked in a pail, and 1 pint of salt was added thereto. After mixing, the contents of the pail were put into a tub containing 4 gallons of water. This was well stirred and left to settle. Then it was stirred thoroughly the second time and left to settle, after which the clear liquid was poured over the eggs, which had previously been placed in a crock or tub. Only the clear liquid was used.

These eggs were well preserved, but those from the bottom of the tub had a decidedly limey taste, and the yolk in them was somewhat hardened.

HENS AND ROOSTERS.

The running of male birds with hens which are only kept for egg-production, is not at all necessary. The hens are better without them. Just as many eggs will be laid, and the latter will keep fresher than those laid by hens running with a rooster.

EXTERMINATING RABBITS.

We learn that a machine has been invented in Victoria by Messrs. Parker Bros., by the help of which rabbits are destroyed in a most ingenious manner. It consists of a small cylinder, containing a quart of poisoned fluid, the discharge of which is effected by air pressure, an ordinary bicycle pump giving sufficient inflation. There is a small zinc platform at one end of the cylinder, and a minute injector at the other. When "bunny" walks over the platform a discharge from the cylinder takes place of a small quantity of fluid, which wets its fur. Naturally, the rabbit begins to lick it off, with the result that the funeral comes off in a few hours. At a trial lately held at Dr. O'Hara's private residence, near Melbourne, some twenty rabbits were let loose on the lawn. All but one died the same evening. It was Dr. O'Hara who discovered this effective poison.

The Orchard.

GREAT BOOM IN FRUIT.

At a meeting of the Ringarooma Branch of the Board of Agriculture of Tasmania, the secretary read the following notice of the boom in fruit in England from the *Glasgow Weekly Mail*:—

The huge shipments of fruit which were poured into British ports every week during the past month show a tremendous increase compared with the imports for a similar period in 1902. The apple, the king of fruit, came to hand in good condition, and met a free inquiry from the leading distributors in the midland and northern markets. This demand is due to the increasing consumption of fruit, particularly among the mining and manufacturing populations, and they can have nothing better. The acids of the fresh, mellow apple are most grateful to the palate of the worker. In 1902 the apple imports for August were 40,659 cwt. Last month they were 148,271, an increase on the supply of one month alone of 107,612 cwt. The imports from January to August, 1902, were 733,376 cwt. This year they were 1,450,236. Already, then, we have imported 716,860 cwt. more of apples than we did for a corresponding period last year. An excess of something like 1,792,150 bushels in eight months is remarkable. Without doubt the foreign apple-shipper is making the most of the shortage of the British fruit crop. Never did his lines fall on such pleasant places before. Fortunes will be made out of the foreign import apple trade this season. Fruit merchants are, says a London correspondent writing in the *Newcastle Daily Chronicle*, making bids to buy up all the stocks they can. The cables are at work daily in the transmission of prices and offers. American apple-shippers have already bought up millions of bushels of apples, and are reaping a fine harvest of profits. The suggestion that famine prices for apples were possible has had the effect of stimulating large purchases of fruit, and thousands of bushels of apples now being sold weekly in Britain are shipments which have been bought by speculators in the business. Never were such deals effected so readily or so extensively before. That is why we have nearly a million and a half cwt. of apples poured into our ports during the month recently closed. So far the apple import trade has cost us nearly a million sterling, and we are only at the opening of the season.

As to the banana, that has again surpassed itself. No one in the trade ten years ago would have credited the possibility of the banana equalling the orange or the apple in popularity. Twenty years ago the dealers with their private underground heated cellars specially fitted up to colour and ripen the green fruit, thought they did a big business when they stocked fifty bunches for the supply of a week. Now there are men who have from 1,000 to 2,000 bunches in stock at the one time. Many of the older men in the wholesale fruit trade, particularly of Covent Garden, became independent through making banana-ripening a special business. The neighbourhood of Covent Garden is honeycombed with mysterious old cellars. We have been through many of them. Some run completely under rows of houses. They were used as secret passages to the river side. Also as underground convent cells, or cellars, connected with the old convent from which the market takes its name. When the foundations of the famous hotel or restaurant known as "Evans," on the north side of Covent Garden market, were dug up, the excavators came across old bricked-in cellars, with irons and chains fastened into the walls. These vaults were admirably adapted for colouring up the fingers of the golden fruits of the banana, for they secured an even temperature, and, with a little heat, enabled the banana specialist to put upon the skin that transparent pale yellow tint that the best retail buyers in the trade were always open to purchase.

regardless almost of price. In those times, that is, a quarter of a century ago, the banana trade was quite a different thing to what it is to-day. Then they made as much as 30s. and 40s. and 50s. a bunch. To-day they can be bought as low as 4s. and 5s.

HYBRIDISING THE MANGO.

We hear a good deal in this State of grafting the mango, but no one has yet come forward with any information concerning hybridising the fruit. *Indian Planting and Gardening* thus suggests the improvement of the mango by hybridisation:—

To anyone who has seen the mango grown in other countries, it must be matter for much speculation why a fruit so highly prized by all and sundry has not been crossed and hybridised to improve it. Perhaps it may be argued that the varieties of mango already in cultivation are sufficient for all practical purposes. This may be so, but were the hybridist to take the matter in hand, some extraordinary results would follow. It is, however, a fact which does not admit of doubt, that hybridising for the improvement of existing varieties of fruits, flowers, and vegetables has made very little progress in India. Indeed, with the exception of a few flowering plants, such as Cannas, Amaryllis, and, perhaps, a few more, hybridising is not practised in India. The Rev. T. Firminger, in the introduction to his book on "Indian Gardening," writes:—"No efforts have been made to improve the races of plants indigenous to the country; no attempt, by any of the more refined processes of science, to produce superior varieties. It has been stated that the fine varieties of mango, for which one locality in Bombay is famous, have resulted from the skill bestowed upon their culture by Europeans, who first settled in that part of India—an assertion that rests upon very slender foundations. This is the only instance, I believe, where it is even pretended that an improved variety of fruit has been produced in India by the art of the cultivator." The foregoing remarks stand good to-day.

Will anyone question that a cross between the well-known varieties of Langra and the ordinary Bombay mango would not be an improvement upon the parents, having the characteristics of both? Yet, has anyone tried the experiment? Again, a cross between the large Malda (so gorgeous and tempting to look upon, but poor in flavour), and the Langra or Bombay, would probably result in a fruit having the size and beauty of the Malda with the flavour of the two latter. The fact remains that no attempt has yet been made to produce new varieties of mango by cross-breeding and selection. I cannot understand why this kind of work cannot be undertaken at such centres as Calcutta, Bombay, Saharanpore, Allahabad, Agra, and Lucknow, in the Government gardens. All the facilities are at hand, good men are in charge of the gardens, and time and money are of no consequence. However, I hope that the foregoing observations will catch the eye of the proper authorities, and that steps will be taken to make an organised effort to improve at least one of India's principal fruits.

THE EXPORT OF QUEENSLAND FRUITS.

The rapid advances made in the various branches of the fruit-growing industry have resulted, in some lines, in the production of more fruit than can be consumed locally. This over-production has necessitated the exploitation of interstate and of the London and other over-sea markets. The export of fruit to the United Kingdom has not as yet been attended with complete success, but, special attention is now being given by the Department of Agriculture to experiments having for their object the preservation of certain fruits long enough to enable them to reach the London market in

first-class saleable condition. There is little doubt that eventually these experiments will result in success, notwithstanding preliminary failures. In fact, it is from failures that we learn to compel our triumphs. Putting aside, then, for the moment, the possible European trade, we will consider the present position of our export trade in fruit to the neighbouring States.

The fruits most generally exported to the South are—citrus fruits, pine-apples, mangoes, watermelons, tomatoes, and cucumbers, to which may be added occasional parcels of strawberries and passion fruit.

The pineapple trade has now grown to very large proportions, and is entirely in the hands of a few wholesale men, from whom the trade purchase their supplies, both in Sydney, Melbourne, and the suburbs of those cities. Large quantities are also sent inland to the various inland towns of the Southern States.

This trade could be extended, we think, to a much greater extent if growers in Queensland would not confine themselves to three or four agents, in whose hands they have been for many years. The country fruit trade draw their supplies chiefly from large Chinese firms, who purchase from the importers. The returns sent to the Queensland growers do not, however, in some cases, represent what the article brought in its first turnover. Only last month, we were informed by a tomato-grower on the Blackall Range that he sent 25 cases of splendid tomatoes to Brisbane in two lots. One lot, he was told by the agent, was too ripe—the second lot too green. In either case the condition of the fruit was said to have so spoilt the sale that, after freight, commission, &c., were paid, the grower received the sum of 6d. for his 25 cases. Nor is this by any means an isolated case. Some years ago we shipped 50 cases of pineapples to Sydney at a time when they were selling in Brisbane at 2s. per dozen, and in Sydney at from 6s. to 8s. per dozen. When the account sales were received, we found we had made a clear loss of 6d. per dozen. The pines were in splendid condition on arrival. We are still wondering who got the profit? Now, if the pine-growers of Nudgec, Nundah, Redland Bay, and other districts would try and open up a direct agency with the large Chinese merchants, they would most assuredly find it to their advantage.

Pineapples are imported into the Southern States from Fiji, but in nothing like such quantities as are sent from Queensland, besides which, from all we can learn, the Fiji pines are inferior to the Queensland fruit, and do not carry so well.

There is one matter which deserves the earnest attention of our growers of pines, and it is one to which too little attention is paid, and to its neglect may be attributed much of the loss attending shipments to the South. We allude to the grading and packing of the fruit. Notwithstanding the clear instructions given by the Instructor in Fruit Culture (Mr. A. H. Benson) on this subject, and notwithstanding the reports of our own fruit-inspectors, our shippers are great defaulters in this respect. Mr. W. H. Knowles, one of the fruit-inspectors to the Department of Agriculture, who has an intimate acquaintance with the fruit trade, was lately in Sydney, and there saw many cases of Queensland fruit opened, and he says that the want of care in grading was only equalled by want of care in packing, and both faults were eminently conspicuous. A Sydney agent said that it would pay the growers much better if they would grade their pines, marking the cases containing the large fruit No. 1 and those containing the small No. 2.

In the matter of packing some of our growers have much to learn. Very few growers of fruit besides pines have any conception of the manner in which fruit settles down in the cases after the lids are nailed on, or of the extent to which it gets bruised and, as a consequence, depreciated in value between the orchards and the markets. It is well known that the pines is a fruit that shrinks, and, if loosely packed, soon bruises. Several cases were opened in Sydney in Mr. Knowles's presence, into which several more pines could have been packed, and on this account many in the cases were bruised. We would earnestly direct our growers' attention to this matter of packing.

Large quantities of pines are shipped in the season from Northern ports, chiefly from Cairns. These are often badly affected with the Mealy Bug. It would be advisable for our Northern fruit-inspectors to request all shippers to brush their pines before packing. Mealy Bug is a disease under the Diseases in Plants Act of the Southern States, and, although our Southern growers are careful to keep their fruit clean, it is to be feared that some day New South Wales may raise an objection to the presence of the disease, and then the Southern growers will have to suffer for the carelessness of the Northern shippers.

A word about shipping pines or their manufactured products to the South African market—a market which will not need to be exploited for a long time to come. A firm in Brisbane sent 25 cases of preserved pines, in 2-lb. tins, to South Africa, about the close of the Boer war. When the account sales reached Brisbane, the firm in question found that, not only had they nothing to receive on account of the consignment, but they had to pay £6 3s. to the South African agents. The duty payable was 4s. per dozen tins, and cartage 1s. per case. What the fruit sold for we have not been informed.

If our fruitgrowers could read a report on "Jamaica Fruits in British Markets," written by a well-known authority on the marketing of fruits in London, Mr. W. B. Gill, their methods of grading and packing would undergo a radical change. For instance, in the matter of shipping immature or over-ripe fruit, his remarks are well worthy of careful note. "Whole folios," he says, "have been written time and again upon the folly of shipping immature fruit, and also about the wretchedly bad packing, careless selection, and indifferent handling; and yet large quantities of fine fruit are sent out of Jamaica . . . with one or more of these points overlooked. Until the lesson has been thoroughly learned by heart, and a proper study made of the extreme carefulness and watchfulness maintained by keen competitors in other countries, and the various handlings and ceremonies that have to be gone through from the time the steamer with the fruit on board leaves the port until it finally reaches the consumer, there can be no remunerative prices looked for on Jamaica fruit in the British market.

Then Mr. Gill gives the Jamaica growers something to remember, and we give it to our Queensland growers as something to remember. He says that this something should be written up in bold letters on the walls of every fruit-packing house in the island, and it is this:—"Every imperfect and poor specimen of fruit that is sent out of the island [for island we will read Queensland—Ed. *Q.A.J.*] is one more nail in the coffin of the industry."

In every case nothing but the very best and the most perfect specimens should be selected and shipped. Many a good shipment has been ruined through a shipper crowding in, at the last moment, a lot of fag-ends and miscellaneous sizes, saying: "Oh, they might as well go through, they'll fetch something."

Mr. Gill has also something well worth noting to say on the subject of pineapples.

Pineapples should never be packed more than 10 or, say, 12 in a package, and these should be in a flat case. The crowns should be left perfectly free, and placed so as not to be at all crushed or injured in any way.

The handsomer looking the crown, the better the price will the pine fetch. Has this point been considered by our Queensland pine-growers? Again the maxim comes in, to never mind the increased freight space for the sake of doing away with what is considered by the shipper as worthless. A choice pine is bought as much for decorative purposes on the dinner table as for the eating. Very choice, fancy pines should never be placed more than six in a case.

Then Mr. Gill has a word of praise for the manner in which Tasmanian apples are shipped. He says concerning them: "I wish it were possible for me to accurately convey to the minds of my readers the appearance of a large consignment of apples from Tasmania which I had an opportunity of inspecting

at the White Star Company's docks. There were scores of cases opened for inspection, and, perhaps, thirty or more varieties. The fruit was all beautifully wrapped and packed in small cases, and looked just the same as if it had been freshly packed in the orchard. I never saw one apple even specked or spotted, much less completely bad, and yet it was over *two months before* since the fruit left the orchard. . . . It is the packing and condition which cause them to sell freely at fancy prices. The usual retail price of this fruit is 6d. per lb., and yet in size and appearance I do not think these apples begin to compare with Canadian and American, which can be bought for less than half the price. The latter fruit is generally shipped in barrels, loosely, and without any grading or wrapping or other attention, while the Tasmanian fruit is put into oblong cases holding about a third of a barrel, and each apple separately wrapped in tissue paper."

To return to our own exports, the banana trade has grown to exceedingly large proportions, and is entirely in the hands of the Chinese merchants. The bulk of supplies comes from Cairns, and from Geraldton, in the Johnstone River district. The Buderim Mountain, Mount Cotton, and Redland Bay districts furnish large quantities of excellent bananas, but these are consumed locally. When Mr. Knowles was in Sydney, he noticed that the quality of the fruit arriving there was much inferior to the sample sent to Melbourne. The bunches were smaller, and the fruit had not filled out; yet, prices were good, and the fruit in strong demand, the selling price being 3s. 6d., 4s., and 5s. per bunch. The Northern inspectors are endeavouring to effect an improvement in the quality of the fruit that is being sent to Sydney.

The bananas arriving in Sydney from Fiji are much superior to our Queensland fruit, being larger in size, better in flavour, and free from the fruit fly. The journey over from the islands takes about seven days, which is little under the time taken from our far Northern ports. The selling price of the Fiji bananas is from 4s. to 5s. to 6s. per bunch.

We have a large export trade in tomatoes to Sydney. Several of the importers complain, as we have stated further back, of the fruit being packed too ripe and badly graded. They consider that no ripe fruit should be put in the cases, but only that which is just on the turn. A consignment sent from Brisbane by the s.s. "Tyrian" was almost unsaleable from this cause. The heat of the ship's hold, where most of our fruit is carried, is sufficient to ripen green tomatoes, and destroy any that are shipped in a ripe condition.

Large quantities of tomatoes have been sent South from Bowen, and many complaints are heard in Sydney about the condition of the fruit on arrival at that port. The sample is small, the quality inferior, the orange cases used for packing are too large for so long a journey, and the fruit is badly affected with the caterpillar. Nothing larger than the quarter plum case ought to be shipped from Bowen.

The cucumber trade is rapidly growing, and, although the season lasts but a very short time, many thousands of cases are sent to Sydney. If the fruit arrives in a green state, fair prices are obtained, but that which arrives in a yellow condition, through being carried in the ship's hold, is almost unsaleable.

Much fruit is damaged on board the steamers by the depredations of rats. These rodents are not at all particular as to what kind of cargo they attack. They have attacked oysters in bags, and fruit and grain of all kinds. They are partial to melons, and Mr. Knowles, when in Sydney, saw several melons in a crate on board a steamer from Brisbane much damaged by rats. Surely something could be done by the steamship companies to destroy the rats on the ships.

We now come to the expansion of the fruit trade.

Large quantities of pines and bananas are being shipped from Sydney to New Zealand, South Australia, and Western Australia. This fruit comes mainly from Queensland or Fiji. The question arises: Why should Queensland growers send their fruit to Sydney when they might just as well establish a direct trade with New Zealand and the States mentioned. Of all the

shippers of fruit in the State, there is only one who ships direct from Brisbane to Adelaide. Now, if it will pay the Sydney merchants to buy our fruit and reship it to New Zealand, Adelaide, and Perth, does it not stand to reason that if our growers were to ship direct to those ports the intermediate profit made by the Sydney houses would find its way to the Queensland shipper?

There is no doubt that a very large and profitable trade could be opened up with Western Australia, more especially in pines and bananas. Pines, if properly packed and picked in a half-ripe condition, could be landed there without risk of loss, if shipped so as to catch the outgoing steamer from Sydney to Perth.

As we have before said, we are of opinion that Australia can consume all its pines without having recourse to the oversea trade to London, and fruit-growers have every reason to look with confidence for an opening in the Southern and Western States, New Zealand, and Tasmania for our yearly-increasing tropical fruit.

The market for mangoes, singular to say, is a very poor one in the South. The importers of fruit say that people are prejudiced against the mango. The reason for this is easily accounted for. It is only of late years that really good, fibreless, fleshy, highly-flavoured mangoes have been grown. What were generally sent to Sydney, we have seen for ourselves, were of the old, poor, turpentine-tasted, fibrous kind, which no Queenslander would look at, seeing what splendid fruit of this variety is now obtainable. Prejudice is hard to kill, but once let our best mangoes get on the markets of the South the prejudice will gradually be overcome, and a good trade will spring up.

To sum up, our fruitgrowers will do well to bear in mind that well-selected fruit, properly graded and properly packed and forwarded to a reliable agent, will ensure the best prices for them in the markets of Australia.

There is one other phase of the fruit export business which we cannot ignore in the interests of the growers, and that is, the want of proper means of transport by rail. Fruit, butter, and kerosene do not travel well together, especially when these articles are packed into an almost airtight van. What is required for the transit of fruit is, special carriages for fruit and for fruit alone, constructed so as to give free ventilation by means of louvres, not only at the ends, but also at the sides of the carriages. In the United States there are special cars for fruit, and in that country the railway authorities would not dream of sending cases of fruit in the same truck as cream, bags of onions, and the general *omnium gatherum* we see usually crammed into a guard's van. It is not our province to animadvert on the facilities afforded by the Railway Department for the carriage of fruit; we merely throw out the suggestion of special fruit cars as a matter which might reasonably be considered by the Commissioner for Railways.

The following practical hints in respect of the packing and shipment of pineapples from the West Indies have recently been published by Mr. H. Hesketh Bell, the Administrator of Dominica:—(1) Exercise the greatest care in handling the fruit from the field to the packing-shed. The slightest bruise at this time involves absolute ruin to the fruit when it ripens. (2) Carefully grade your pines. Do not put large and small in the same crate. Pines weighing less than $3\frac{1}{2}$ lb. are hardly worth shipping to London. (3) Pack your fruit with all possible precaution. Wrap them first in clean paper, and then liberally swathe them in dry banana trash. Be most careful to prevent the fruit from rubbing against the wood framing of the crate. Do not cram your fruit into the crate. Be satisfied to pack eight pines safely rather than ten which may arrive damaged and worthless. (4) Never be tempted to use anything else but *crates*, or, in winter, closed cases. Pines in barrels are a by-word in Covent Garden market. A planter friend in Antigua, who has recently been in correspondence with me on the subject of pines which he sent to London some weeks ago, packed, upon my recommendation, in *crates*, realised 3s. 3d. per fruit. The pines that were shipped in barrels by the same steamer fetched $2\frac{1}{2}$ d. each. It is, however, only fair to say that the fruit sent

in barrels were of the ordinary Antigua variety, while those shipped in crates were "Smooth Cayenne" and other specially fine kinds. The standard crates used by Florida pine-growers measure 10 by 12 by 36 inches. (5) If possible, get early or late fruit. Pines are cheapest in London during June, July, and August. During the winter they realise great prices.

A MARKET FOR PINEAPPLES AND OTHER QUEENSLAND-GROWN FRUITS.

In pursuance of the efforts which are being made by the Department of Agriculture to find a profitable outlet for Queensland-grown pineapples and other fruit, inquiry has been made as to the probability of a market for pines being found in South Africa, and Messrs. Dalgety and Company, Limited, have forwarded to the Department the following letter lately received by their Melbourne branch, under date 18th November, 1903, from Messrs. William Cotts and Co., of Durban, relative to pineapples:—

"We are in receipt of your favour of the 21st ult., inquiring about the sale of tropical and semi-tropical fruits at this port. We may say that, as far as pineapples are concerned, we have an ample local supply, and they are sold on our town market for 4d. per dozen at the height of the season, which would be just about the same period as your own.

"The only fruits which have any sale worth speaking of here are apples and pears, as we have abundance of local fruit of all descriptions."

ROOT-PRUNING FRUIT TREES.

A writer in the *Irish Times* says that strong growing young trees, as well as old unfruitful ones, are the class of trees requiring to be root-pruned. In the case of vigorous, barren, young trees, growing all wood and no fruit buds, it is often necessary only to pass a spade into the soil a couple of feet from the stem, and in the direction of the centre or tap roots, and then, making a lever of the spade, the tree is lifted slightly, and then allowed to settle back on its former bed. After this simple operation, the soil should be pressed down by slightly tramping it. With old trees, the work is of a more tedious nature, and should be spread over two or three years. An expert gardener says root-pruning is a necessary operation most years where a quantity of trees are grown, but doubly so when fruit crops are light, coupled with a comparatively wet summer, both aiding tree growth. With aged trees such work is best done piecemeal—one-half the tree tackled this autumn, the other side in a year's time. With medium-sized trees the operation may be completed at one stroke, and, in the case of over-luxuriant young trees, lifting and replanting is the best cure. To root-prune, a trench 1 foot wide should be opened, from 2 feet to 3 feet from the stem, according to the size of the tree, and then working away the soil with a garden fork, undermining the ball of soil to ascertain whether any roots have got into the subsoil, cutting close up to those that are found, and preserving all fibrous roots. When filling up the trench, the ground, immediately underneath the tree especially, should be rammed quite firm, using the top spit for the purpose, after mixing a good percentage of lime or old plaster with the soil. Maiden fibrous loam, with a little wood ashes mixed in, may be given the tree as filling proceeds. This refers to large trees, young specimens requiring but little aid in this way, as strong growth quickly sets in again; and should any be given, keep it towards the surface, so as to encourage the roots in that direction. Trees carefully treated as advised should not fail to carry fruit next year, but it will take a couple of years before the benefit of root-pruning can be noted, especially fruit trees bearing on the spur principle.

Botany.

By F. MANSON BAILEY, F.L.S., Colonial Botanist.

THE INDIGENOUS FALSE GINGER.

In Southern Queensland two plants—viz., *Alpinia cœrulea*, and its variety, *Arundeliana*—are both known by the vernacular name of "Native Ginger," on account of the whole plant and particularly the rhizome (root-stock) having the scent and pungency of the ginger. Now, when we consider that the so-called preserved ginger of China is prepared from the rhizomes of a species of *Alpinia* (*A. zingiberina*), might not the same part of one or other of our species be used for a similar purpose? The present, also, seems an opportune time for a trial to be made, as from the abundance of rain which we have had for months past the young growth of the rootstocks would, in all probability, be more than usually tender. Two other species of *Alpinia* and a variety of the true ginger (*Zingiber officinale*) are met with in the tropical parts of Queensland.

Mr. L. A. Bernays, C.M.G., in his "Cultural Industries for Queensland," gives the following as the mode of preserving ginger:—"The roots are taken up as soon as they are formed, when still young and tender. This will vary somewhat, according to the season which follows planting, but will be at somewhere about two months old, when the stalks are not more than 5 or 6 inches high. The tubers in this state are scalded, washed in cold water, and peeled clean. The water in which they are washed is frequently changed, and this process lasts for three or four days. A syrup is then made of 1 lb. of sugar to 1 pint of water, into which the beaten whites of 2 eggs are gradually stirred. This syrup is then boiled and carefully skimmed, and when quite cold it is poured on the tubers. After two or three days the syrup is poured off, reboiled and skimmed, and when cold poured over again, and the whole is left for three or four days. The next process is to reboil and reclarify the syrup, which is then, for the first time, applied *hot*. If necessary, the process is repeated until the syrup has well penetrated the ginger, which is evidenced by the taste and transparency of the tuber, and until the syrup becomes very thick and rich. The syrup must not be applied hot in the first instance, or the ginger will shrink and shrivel."

SPARROWS.

A correspondent of the *Florida Agriculturist* says that, although the sparrows have arrived in Tampa, there is no cause for a panic, and, after twenty years of experience, he comforts the farmers thus:—"Supposing the sparrow's life to be ten years, it is obvious that for this period the old ones will be included in every census and this is the time when all are dumfounded by their awful rate of increase; you expect shortly to be knee-deep in sparrows. But after the tenth year an increasing number will drop out every year, and by the twentieth year the balance between life and death will be restored. If millions are born, millions have reached the limit. For this reason and others, perhaps, sparrows are much less numerous and aggressive hereabout than formerly. The people do not like them and they get a charge of shot now and then, but no systematic effort has been made to exterminate them so far as I know. The nests are easily located by the constant chirping of the young, and if all householders will see that none are raised on their premises the question is solved, and this is better than action by the city government. When I tore down a nest I noticed that the old ones decamped at once, and they have not nested with me for some years now.

Horticulture

WISTARIAS.

Wistarias will, during the summer, send out long shoots, and, consequently, produce a great deal of wood. Unless the plant is required to close in a veranda or cover an outbuilding, it is well to nip off the greater portion of these shoots, leaving about two or three eyes of the former growth, much as grape vines are pruned. The effect of this will be to cause an abundance of flowers, which, after all, constitute the main beauty of this favourite climber.

GARDEN MANURES WASTED.

The successful raising of vegetables by the Chinese gardeners is proverbial. Why is it that whilst their gardens are always well stocked with various kinds of vegetables, even during a severe drought, the European gardener laments his inability to grow anything saleable? This secret lies in their careful husbanding of all kinds of manures. Every thing that can possibly produce humus, or nitrogen, or phosphoric acid, or potash is utilised by them. Not that they probably know what constituents they are putting into the soil, but long experience has taught them that decayed animal and vegetable matter will produce certain results when incorporated with the soil. When a European gardener shoots a cat or a predatory animal of any kind, or when a hen dies, or when he catches a rat, he either burns them or buries them in the paddock. Dead leaves and decayed vegetables he either throws over the fence or burns. Not so the Chinaman. He knows the value of a compost heap. He knows that old bones, decayed meat, dead leaves, cabbage stalks, ashes, and other refuse will help him to produce good crops of vegetables. Most people allow soapsuds and other slops to run to waste, not knowing that soapsuds have a great value as plant food. If those who have flower gardens or a small vineyard would only apply soapsuds to their plants, they would find that, although these will not permanently enrich the soil, they will cause vines, roses, and annuals to grow much more luxuriantly than if they are merely watered periodically. A dead cat or hen buried under a passion-fruit vine will cause it to fruit and grow more vigorously than it otherwise would. In the case of a passion-fruit vine, fresh cow-droppings have a marvellous effect. Even in the very worst shaley soil, if a fair-sized hole be dug and a bucketful of perfectly fresh cowdung be placed in it mixed with a little soil, and the young plant be planted on this, the rapid growth of the vine is marvellous. The value of cowdung is not nearly so much appreciated as it should be by gardeners. The cowyard is left to the mercy of wind and rain, which rapidly remove the most valuable constituents of the manure; whereas, if it were collected every day and added to a compost heap, a valuable garden manure would be saved. We have been so much accustomed to virgin soils, scrub and plain, that when at last they begin to lose their fertility we look upon them as worked out, and take no trouble to renovate them, on the score that "manuring does not pay." That is where so many make a mistake. Manuring will always pay, whether the manure be natural or artificial, provided that drainage and subsoiling are not neglected.

COTTON CULTIVATION, No. 1.

By A. J. BOYD.

Although it is not proposed to give, in these papers, which are primarily intended as a guide to Queensland cotton-planters, a detailed account of the history of the cotton plant and of its gradual dissemination throughout the tropical and semi-tropical world, still any treatise on the plant and its cultivation would be incomplete without some short dissertation on its origin and present distribution, as much depends upon geographical and climatic data for its successful cultivation in various parts of the State, where, owing to the wide range of climate, difference in rainfall, and geographical position of lands suitable for its cultivation, the conditions under which successful production may be attained vary in equal degree. Different varieties of cotton demand different situations, varying weather conditions, and different planting seasons. Hence some knowledge of the original habitat of the varieties of the cotton plant is necessary to enable the intending planter to avoid mistakes which may involve him in serious loss.

Cotton was grown to a limited extent in China 200 years before the Christian era, and Herodotus states that it was grown and used in India 445 years before that period. The discoverer of Peru found the cotton-producing industry in that country in a very flourishing condition, and at the present day large quantities of excellent cotton are produced there. Brazil is also a congenial home of the cotton plant, which thrives throughout the country, although it succeeds to the greatest perfection on the dry northern tablelands, more especially in Pernambuco. The West Indies, Mexico, and the South Sea Islands, as well as Japan, all produce cotton of more or less value in the world's markets. Large quantities of fine cotton are grown in Egypt, the Sea Island variety produced on the coast being unsurpassed. Singularly enough, although cotton-growing in that country dates far back into the mists of time, it was apparently unknown to the ancient Egyptians, as no cotton cloth is found on the mummies in the sarcophagi, linen cloth being invariably used for enwrapping the dead.

It has now to be observed that the cotton-growing districts of all these and other countries lie within a certain zone, beyond which its cultivation has not proved profitable. This zone or belt is comprised between the parallels of 36 degrees north and 36 degrees south of the Equator. Except under special climatic conditions, cotton cannot be produced as a commercially profitable crop beyond these limits; and even within the favourable zone it will be easily understood that there are extensive areas unsuitable for cotton-growing. Such are, for instance, the high tablelands, with their short summers and frosty winters, which are unfavourable to the proper development and maturing of the crop. For certain varieties of the plant an atmosphere impregnated with the ocean salt is needed, and, generally it will be noticed that the cotton plant loves the low plains and valleys, and it is on this account that in most countries the largest areas devoted to cotton-growing are found on or near the coast. The cotton plant succeeds best in localities where there is an equable climate, not subject to sudden variations of temperature. The South Sea Islands are surrounded by the warm Gulf Stream of the Pacific, in the same way as the West Indies are affected by the Gulf Stream of the Atlantic. The warmth diffused by these streams gives rise to considerable condensation, resulting in a dampness of the atmosphere and heavy dews, which contribute in a great degree to the perfect maturing of the fibre. Cotton loves a warm atmosphere, and where this is found there the plant will reach the greatest perfection, since the temperature of air and soil are practically in accord, and remain equable during the whole growing season. These, then, are the climatic conditions to be sought by the cotton-planter.

In this State they are found along the whole seaboard, and, as a consequence, the whole of our coast lands, where the soil is suitable, are adapted to the production of excellent marketable cotton. It should, however, be observed that the Sea Island or long-stapled varieties are unsuitable for the Southern portions of Queensland. Although the South Sea Island cotton plant demands sun heat, it also demands a moisture in the atmosphere, and this it only finds in the more tropical parts of the State, say northwards from Mackay. The Egyptian, and certain Uplands varieties find a congenial atmosphere in the Southern districts. These varieties can withstand long spells of dry weather, whereas any long absence of moisture is injurious to the Sea Island plant. The latter, when grown in the South, certainly produces good fibre, but not in sufficient quantity, and the plant itself runs far too much to wood.

By many people it is believed that the cotton plant is a drought-resister which is not destroyed by protracted droughts. I have certainly seen fine cotton plants in the Western Central districts, 500 miles from the coast, which were growing luxuriantly throughout the protracted drought which terminated in 1903. For two or three years these plants had been unacquainted with visible water in any form; but it does not follow from this that cotton can be successfully produced on a commercial scale in an arid wilderness. Long-continued dry weather has an injurious effect on the crop, in that it checks the production and growth of the bolls, and is the cause of the fibre being too short to be of much value. On the other hand, should there be too much rain, the plants run to wood, to the detriment of the fruit. A certain amount of rain or other moisture is required before the blossoming period. After the bolls have formed, dry warm weather is needed, and more especially when the bolls have burst. I now come to

THE CHOICE OF SOIL.

This is a most important matter to the cotton-grower. Whilst the plant will *grow* on almost any soil, it does not follow that it will be equally *productive* on each. The soil on which cotton thrives best need not be of the richest description, but neither may it be deficient in the special plant food needed by this crop. Some of our richest soils, in the old cotton-growing days, which now produce heavy crops of maize, sugar-cane, and potatoes, yielded very indifferent cotton crops, whilst poorer soils, under exactly the same other conditions, gave handsome returns. Cotton is a somewhat exhausting crop, but if the meal and hulls from the seed are returned to the soil it is not so. The practice so long followed in the Southern States of America, of planting the same land, year after year, with cotton, brought ruin to the soil, not so much on account of the exhaustive nature of the crop, but because of the constant washing of the soil by heavy rains and its exposure to the sun. With a carefully planned rotation of crops and liberal fertilisation, the cotton lands will not deteriorate. An application of a few hundred pounds of commercial fertiliser often makes all the difference between a profitable crop and a total failure. On some soils kainit is a complete specific against red rust and some other troubles to which cotton is subject. On heavy clay soils stable manure is the best fertiliser, but, as stable manure is not procurable on the farms in Queensland in sufficient quantities, the next best thing is to use 500 to 900 lb. of a fertiliser containing available phosphoric acid 8 per cent., potash 3 per cent., nitrogen 2 per cent. On sandy soils deficient in potash, it will pay to add a liberal dressing of kainit.

In choosing a soil for the purpose of cotton-growing, a sandy loam, rich in humus, should be preferred to a heavy, rich, black soil. Heavy clay soils should be avoided, as such are more difficult and expensive to work—cannot be worked at all during continuous rainy weather—and hold water to such an extent that growth is practically stopped. Such lands require an admixture of large quantities of lime and sand. Stagnant water is one of the worst enemies

of the cotton plant. What is required to ensure a good crop is a free soil, with good drainage, enabling the plants to obtain all the moisture they need, whilst at the same time the superfluous water drains away. The cotton plant sends a long taproot into the ground, and it is this which enables it to thrive in continued dry weather, the taproot going deep down (from 16 to 24 inches) in search of the needed moisture. The most ideal soils for cotton in the United States of America are the limestone regions of Georgia, Alabama, Mississippi, and portions of the neighbouring States. There the subsoil consists of a soft yellowish-white limestone, of the soft texture of chalk, containing about 76 per cent. of carbonic acid. The surface soil contains, however, only a small percentage of lime, with a considerable quantity of potash, soda, magnesia, and silicic acid. A remarkable feature of this soil is its fine disintegration and the intimate mixture of its constituents. In dry weather it appears to be all dust. It becomes very hard under the summer heat, and in wet weather is more sticky than ordinary clay. It is not very porous, and capillary attraction works slowly but continuously, and hence moisture is drawn to the surface from considerable depths. It possesses also the property of drawing large quantities of ammonia from the air.

Such soils are frequently met with in Queensland, and notably in the West Moreton district, where more cotton has been grown than in any other part of the State.

Aspect is immaterial, provided that the field be not exposed to constant drying westerly winds, which exercise a most harmful influence on the development of the plant. The latter requires all the sun it can get, and if there is plenty of moisture in the soil the rows of plants should run north and south to lessen the shade as much as possible; but in very hot countries, where the air is dry and the rainfall small, it is better to draw the rows from east to west, in order to retain as much of the soil moisture as possible by shading it with the plants.

The preparation of the soil for a crop consists in ploughing and cross-ploughing as deep as possible; and where the subsoil is stiff, the subsoil plough should be used to loosen it, but it should not on any account be brought to the surface. Unless the soil is thoroughly loosened and reduced to a fine tilth, a heavy crop of cotton cannot be expected.

CARAVONICA COTTON FOR THE SOUDAN.

By a late December mail, Dr. Thomatis, of Cairns, received an order for seed of the Caravonica cotton from the Soudan (Government House, Berber). It appears that it is intended to grow this variety of cotton to a considerable extent, both in the high levels and on plains irrigated from the Nile. Dr. Thomatis has sent us samples of three varieties of his cotton—namely, the Caravonica, as originally produced by hybridisation; the New Caravonica, another cross between the Caravonica and the kidney seed cotton; and the kidney seed cotton itself. The idea of crossing these two varieties was to produce a finer, whiter, and silkier cotton than the Caravonica, and at the same time to disintegrate the group of seeds of the kidney-seeded cotton, and scatter them singly about the bolls, thus rendering the cotton easier to gin. These results have all been obtained. The bolls sent to us are very fine specimens, being very large, the seeds distributed, and the fibre long, white, and silky. Still, the new Caravonica has not beaten the old, either in size of boll or quality, although the fibre is finer and more silk-like.

Before the floods in April, 1903, Dr. Thomatis had 20 acres under cotton, but 13 acres were destroyed by the water, when just two months old. But, nothing daunted, the indefatigable doctor has set to work to repair damages, and expects by next April to have 100 acres planted. We shall shortly have a visit from Mr. Bottomley, agent for the Cotton-growers' Association in the old

country, and his verdict on the cotton at present being experimentally grown in Queensland will be eagerly awaited. It would seem as if cotton-growing were about to be energetically revived in Queensland, and, with the bonus which may be granted by the Federal Government, we have every reason to hope that the industry will be put on such a firm basis that it will be able to hold its own when the bonus is withdrawn, and become one of the great settled industries of the State.

CARDAMOMS.

A correspondent asks, "What are Cardamoms? What use are they put to?" Following is a short essay by Mr. P. C. MacMahon, of Urugala, Ceylon, which was published in the *Times of India* and reproduced in the *Ceylon Tropical Agriculturist*. The essay was originally intended for circulation at the St. Louis Exposition under the scheme approved by the executive committee, but was not accepted owing to its length.

The cardamoms of commerce are the cured fruit, or capsules, with their seed, of a plant known botanically as *Elettaria cardamomum*, Mat. Many kinds, more or less related to the above, grow wild in the higher mountain forests of Ceylon, Southern India, Cochin-China, Madagascar, and a few other countries. Of the above-named species, what is known as the "Mysore" variety is the kind now almost entirely cultivated in Ceylon. It is distinguished from some of the others by a more robust habit, smooth, glossy leaves, tall and erect inflorescence, unfurrowed and slightly elongated capsules.

The plant is of a bulbous nature, and in the laying out of a plantation two of its bulbs, with the whole of their long stems, which sometimes reach to the length of 12 feet, are planted in shallow holes, at the distance of 7 feet by 7 feet, or 8 feet by 8 feet, according to the fancy of the planter or the nature of the soil he is bringing into cultivation. The stems are allowed to lie flat on the ground. Great care must be taken in choosing soil, as only the richest loam of the primeval forests will successfully grow this product.

The trees of the latter must be thinned out, to afford the plants sufficient light, and, at the same time, to exclude the direct rays of the tropical sun. After two months shoots appear above ground from the planted bulbs, and, as these grow and mature, they in turn throw out further shoots or stems, until at the end of three years a large clump of from 3 to 4 feet in diameter is formed—the inflorescence or racemes, which also rise from the bulb, intermingling with the stems or in sloping situations gracefully hanging over. The racemes are now covered for the whole length with bracts from which spring the pretty orchid-like flowers of whitish colour with centre pink markings. These flowers are great favourites of the wild bees of the island, who gather from them a rich store of honey and wax, and, at the same time, freely bestow their humming services in successfully fructifying the same—the fruit buds of which, after three to four months' growth, changing into ripe capsules. When arrived at this state they are collected by the labourers of the estate into bags and carried to the curing factory, where they are at first washed, and, for several days after, bleached and dried in the sun, care being taken to avoid discolouration either by rain or damp, and at the same time prevent, as much as possible, by not too great exposure, the capsules from bursting and losing their precious seeds. The next work is clipping the dried stems of the capsules which came off with them when being plucked. This work is done by women with small scissors, and is a slow and delicate operation. After having been clipped, they are further bleached and dried, and then sorted into different grades, usually called Nos. 1, 2, 3, 4, "splits," and "seeds," after which they are packed in paper-lined boxes and despatched to the metropolis of the island, Colombo, where they are either sold locally for export to India, or shipped to England and the "continent" for commercial sale.

The uses and virtues of cardamoms have been known to many of the Eastern nations from the earliest periods, and so highly do the Hindus value them that they have bestowed on the seeds the poetical name of "grains of paradise." In the receptions of the higher classes of this nation among themselves sugar-coated cardamoms are always presented to the guests, and often on these occasions the youthful mother of the house, if there happen to be such a one, hands or leads round for inspection what she in the intensity of her delight loves to call her "sugarcardamom"—namely, her latest-born babe and favourite child. The consumption of cardamoms by these people and the Burmese is very great, and must reach close on 1,000,000 lb. annually. They use them extensively in cooking, in the manufacture of confectionery, toilet oils, medicines, tooth-powders, and in masticating with the betel leaf, which is a kind of pepper. In England and other States of Europe they are largely used, and the export from India and Ceylon and Indo-China to there totals now over another 1,000,000 lb. per year. The principal uses which the home countries apply them to are the manufacture of cakes, confectionery, sausages, liquors, and in the packing of fruit, fish, &c., &c. In the public bars, too, they are also coming into use for dispelling from the breath of the frequenters the nauseating smell of tobacco and alcohol. In medicine and for toilet purposes their use is legion, and far too numerous to mention here. On the whole it may be safely said that as a spice they are now the most appreciated of any known to mankind. This to some extent is shown by the rapid extension of cultivation in Ceylon—that island in 1883 exported only 21,655 lb., while in 1902 it rose to 615,922 lb., and this year it is expected to yield 750,000 lb.

It is to be regretted that the "giant republic" so far this year has taken direct only 1,215 lb. By the help of the better knowledge of the spice which this great Exposition will afford its people, and the fast rising commercial marine which the nation is sending forth, it may safely be predicted that a larger import of cardamoms and more reciprocity of trade will soon spring up between it and "little Ceylon," the Taprobane of the ancient Greeks and "Pearl of India."

Publication Received.

SAPSFORD'S QUEENSLAND ALMANAC AND GAZETTEER FOR 1904.

We have received the above gazetteer from the publishers, Messrs. N. Sapsford and Co. Whilst recognising the great value of that veteran publication, "Pugh's Almanac," we think that the new Gazetteer will prove of infinite service to those who, owing to its bulk and price, cannot afford the older work. In addition to the merit of cheapness, "Sapsford's Almanac" gives a surprising amount of information in small bulk. In it we find an up-to-date calendar, various meteorological tables, the times of sunrise and sunset, phases of the moon, tide tables for various ports, a list of light-houses on the coast, sailing directions, and a number of well-written articles on such subjects as mining, agriculture of the State of Queensland, irrigation, a summary of the land laws, with all information as to how to take up land for close settlement, together with information concerning our Parliaments, the Commonwealth tariff, postal information, &c. Several pages are devoted to a list of nearly all the post towns, telegraph stations, money-order offices, and railway stations in the State, comprising about 1,500 centres of population, giving the distances from Brisbane, the means and times of communication by sea, rail, and vehicle, together with the population of the principal towns. We consider that this information alone should ensure a place for the Gazetteer on every office table and in every private house. The book is issued in very handy form, is printed in clear type, and altogether it is a most creditable and valuable publication.

Vegetable Pathology.

A METHOD FOR RENDERING CUCUMBER AND TOMATO PLANTS IMMUNE AGAINST FUNGUS PARASITES.

In cold and temperate climates tomatoes and cucumbers are usually grown under glass. When plants are grown in the open, infection by fungus spores occurs almost entirely during the night. George Masee, V.M.H., of Kew, deals with the subject in a paper published in the *Journal of the Royal Horticultural Society* (October, 1903).

He says: In the case of plants growing under glass, the conditions are always highly favourable for the production of "soft" foliage; hence their extreme susceptibility to infection from fungus spores; whereas plants of the same kind grown out of doors or even under glass under more normal conditions remain free from disease.

Under the exceptional conditions of cultivation described above, not only do the well-known parasites of the tomato (*Cladosporium fulvum*, Cooke, and *Fusarium lycopersici*, Sacc.) and of the cucumber (*Cercospora melonis*, Cooke) flourish luxuriantly, but certain other fungi, normally occurring only on decaying vegetable substances in the open, now and again assume a parasitic existence when accidentally introduced into houses where the conditions are so favourable to their development.

The case of *Dendryphium comosum*, Walk., may be given as an illustration. This minute fungus is not uncommon in Britain and other countries. It grows on decaying plants, which it frequently covers with a dense, dull, olive-coloured mould.

During the present season, a market gardener brought a number of diseased cucumber plants to Kew for examination. . . . Microscopic examination and repeated cultures and inoculation showed the blotches on the leaves to be caused by *Dendryphium comosum*. Further investigation showed the fragments of manure projecting from the soil in which the plants were growing to be covered with a copious development of *Dendryphium*, and the fungus was finally traced to the manure heap.

Previous to the present record, *Dendryphium* has never been known to act as a destructive parasite; and its becoming so in the present instance is entirely due to its accidental introduction, along with the manure, to a set of conditions which enabled it to assume a parasitic existence on plants predisposed to disease. Experiments conducted at Kew prove conclusively that *Dendryphium* cannot attack cucumber plants growing in a cool frame. . . .

The use of fungicides in the form of sprays has not by any means produced the results desired and anticipated, and experiments extended have demonstrated that, under the conditions necessary for the rapid production of cucumbers, the daily syringing and constantly damp surface of the foliage render useless those fungicides which, when applied under more favourable conditions, have proved effective.

Under the circumstances, a series of experiments has been carried out with the object of ascertaining whether some substance taken up by the roots of cucumbers and tomatoes would not render plants thus treated immune against the attacks of fungus parasites, without, at the same time, exercising any injurious or retarding effect on growth or on the production of fruit.

From among the various substances tested, sulphate of copper (CuSO_4) alone met all the above-mentioned requirements.

The following is an outline of the mode of treatment of plants rendered immune by the use of sulphate of copper:—

The cucumber and tomato seed was sown and the plants grown throughout in a stove, having a mean temperature of 75 degrees Fahr., the humidity varying between 79 degrees and saturation point. The potting, watering, spraying, and general treatment were left entirely to a gardener, and consequently was conducted along the lines followed in establishments where

the fruit is grown for sale. . . . Three hundred cucumber seedlings and an equal number of tomato seedlings were subjected to experiment, fifty of each kind being used as check plants. When the seedlings were a fortnight old, the cucumbers were grouped round eight large cucumber plants badly attacked by *Cercospora melonis*, Cke., and *Dendryphium comosum*, and the tomato seedlings were arranged round a tomato plant bearing numerous blotches on the leaves caused by *Cladosporium fulvum*. At this period the specific course of treatment commenced, which consisted in watering the plants every third day with a solution consisting of 1 part of copper in 7,000 parts of water. The check plants, which were not watered with the copper solution, were indiscriminately mixed with the treated plants. The watering was done during the afternoon, and the quantity used for each plant was sufficient to soak the soil thoroughly.

After a month's treatment all the tomato plants were perfectly free from disease. On the other hand, one or both cotyledons of thirty-four cucumber plants showed blotches of the disease. At the same time, a considerable number of the untreated check plants, both cucumbers and tomatoes, were badly diseased.

At this stage both treated plants and checks were sprayed with water containing the spores causing their respective diseases, and this was continued weekly until the end of the experiments. Under this drastic treatment all the untreated check plants were badly diseased during the following two weeks. After six weeks' treatment with the solution of sulphate of copper of the strength indicated above, the strength was increased to 1 part of sulphate of copper in 6,000 parts of water, and the soil was soaked every fourth day until the end of the experiments, which lasted eleven weeks. At the expiration of this period, both tomato and cucumber plants were bearing a good crop of well-grown mature fruit.

Not a single one of the tomato plants treated with the sulphate of copper solution showed a trace of disease; and in the case of the treated cucumber plants the disease never extended beyond the cotyledons, and this notwithstanding the fact that badly diseased plants were growing amongst the treated plants during the whole period. . . . It now simply remained to ascertain whether any of the copper taken up by the roots of the plants had been deposited in the fruit. Specimens of tomatoes and cucumbers borne by the treated plants were examined in the Government Laboratory by Dr. Thorpe, C.B., F.R.S., and he reported that there was no evidence that the amounts of copper present were sensibly greater than are found in the fruits obtained from the non-treated plants. The paper concludes with

PRACTICAL DIRECTIONS FOR TREATMENT.

Commence watering cucumbers and tomatoes, when a fortnight old, every third day with a solution consisting of 1 oz. of sulphate of copper dissolved in 50 gallons of water. After treating for six weeks as above, commence watering every fourth day with a solution consisting of 1 oz. of sulphate of copper in 35 gallons of water: The sulphate of copper should be pure, and rain water should be used if possible.

[With reference to the above experiments, we wish it to be understood that we merely give them as an example of what has been done in a climate very different to our own, and in a case where a fungus disease (*Dendryphium comosum*) is present, which we believe has not been yet noticed in Queensland. *Fusarium lycopersici*, we are informed, is found together with other diseases on the tomato in this State. It does not, however, follow that the above treatment will necessarily be effective here. Still, remedies recommended for certain fungus diseases by so eminent an authority as George Massee are deserving of serious attention. In all cases of diseases of tomatoes and cucumbers which the grower cannot successfully contend with, the safest course is to communicate with Mr. H. Tryon, Entomologist and Vegetable Pathologist to the Department of Agriculture, who is at all times ready to investigate such diseases, find out the cause, and suggest the remedy.—Ed. Q.A.J.]

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1902.	1903.											
	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
<i>North.</i>													
Bowen ...	3.16	1.66	7.65	16.44	1.44	2.04	2.77	0.31	0.22	0.51	1.36	3.14	6.13
Cairns ...	5.15	21.32	10.23	32.51	15.50	1.67	0.51	0.87	0.44	0.47	0.91	3.10	13.51
Geraldton ...	5.53	38.94	17.24	45.00	14.03	7.48	3.42	2.07	7.08	3.79	3.05	7.13	37.86
Herberton ...	7.02	6.88	3.69	20.80	12.04	0.64	1.00	0.19	0.33	NIL.	0.67	6.21	15.52
Hughenden ...	2.77	1.52	0.99	0.95	0.81	1.73	NIL.	0.07	0.31	0.65	0.80	2.36	5.30
Kamerunga ...	3.79	20.36	10.82	37.45	19.32	2.14	0.50	1.10	1.50	0.86	1.39	4.94	14.33
Longreach ...	1.56	1.91	0.09	3.48	NIL.	3.51	NIL.	0.69	NIL.	1.58	0.90	0.83	1.76
Lucinda ...	2.47	17.43	11.66	44.24	6.44	6.38	2.44	2.38	4.39	0.30	0.76	10.67	40.34
Mackay ...	7.71	10.45	6.47	13.51	1.50	6.75	2.49	2.53	0.59	0.44	1.54	9.86	5.52
Rockhampton ...	5.60	0.92	1.68	3.73	1.12	8.93	0.08	3.73	0.68	0.51	1.84	7.42	4.08
Townsville ...	6.50	4.66	8.11	19.80	1.61	2.08	1.02	0.05	0.19	0.44	2.42	5.97	19.02*
<i>South.</i>													
Barcaldine ...	6.41	3.73	0.40	0.94	NIL.	4.92	NIL.	0.90	0.50	4.23	1.01	4.00	0.92
Beenleigh ...	1.83	1.88	4.77	6.49	1.90	12.40	0.92	5.04	2.26	4.13	3.29	4.78	1.60
Biggenden ...	8.93	2.25	3.15	3.95	0.16	1.28	2.07	3.90	1.62	2.23	2.77	4.37	5.62
Blackall ...	4.61	3.04	1.50	3.87	NIL.	5.19	NIL.	1.81	0.75	2.25	0.45	2.56	1.79
Brisbane ...	1.82	1.31	5.35	4.79	1.33	11.82	0.73	5.56	3.84	4.73	3.65	3.98	2.19
Bundaberg ...	1.38	0.97	2.60	6.05	0.38	11.55	0.33	5.98	0.88	3.55	0.43	3.25	9.97
Caboolture ...	1.74	5.15	3.42	9.59	1.39	16.14	0.92	6.08	3.27	4.41	3.11	11.66	4.18
Charleville ...	4.79	1.70	0.43	2.94	1.08	2.94	0.02	1.61	0.62	3.40	0.95	2.20	2.98
Dalby ...	3.20	1.28	1.22	4.69	1.33	6.00	0.03	3.78	2.30	3.30	3.12	6.30	1.19
Emerald ...	8.42	2.30	2.49	1.43	0.26	3.43	0.02	0.57	0.24	1.23	1.90	2.21	4.30
Esk ...	7.67	1.32	3.51	4.46	1.25	9.27	0.30	2.97	4.21	4.86	3.69	4.02	1.43
Gatton College ...	5.14	3.68	3.81	2.60	0.79	7.55	0.17	4.15	2.50	3.56	4.71	5.05	1.04
Gayndah ...	3.37	0.77	2.03	2.30	0.09	6.03	0.05	2.81	1.06	2.62	4.37	3.03	5.12
Gindie ...	7.14	1.43	3.15	0.49	0.19	3.31	NIL.	0.51	0.30	1.58	1.97	4.06	4.26
Goondiwindi ...	2.21	1.84	0.72	4.40	1.73	5.07	0.15	4.38	2.09	4.22	2.16	3.73	3.62
Gympie ...	4.32	2.40	3.27	5.96	1.28	10.20	0.62	1.67	2.72	2.42	5.61	4.50	4.68
Ipswich ...	1.84	1.36	5.55	3.79	2.24	9.56	0.85	3.64	2.70	5.24	2.98	3.84	1.01
Laidley ...	5.13	0.71	3.63	2.63	0.95	8.20	0.20	4.65	3.06	4.25	5.47	3.87	1.82
Maryborough ...	4.02	2.09	2.76	3.23	0.66	9.58	1.60	6.17	1.09	1.93	2.62	3.96	5.04
Nambour ...	2.64	2.53	5.03	5.18	0.83	19.46	1.29	5.38	3.95	3.61	3.85	6.13	2.43
Nerang ...	1.73	3.36	4.73	4.84	3.04	15.75	2.36	7.34	2.21	3.81	3.52	3.86	4.24
Roma ...	2.35	0.75	0.15	2.48	0.39	3.17	0.34	2.26	1.13	6.61	1.92	3.16	4.21
Stanthorpe ...	1.75	0.23	1.59	0.95	1.18	6.87	0.74	4.71	1.98	6.07	3.45	4.45	2.59
Tambo ...	4.14	2.43	0.15	4.73	0.02	1.96	0.01	2.64	0.27	4.33	1.08	3.17	2.91
Taroom ...	2.88	4.32	1.53	1.29	0.82	8.83	0.23	3.83	2.21	1.61	2.05	3.76	3.22
Tewantin ...	1.35	1.90	5.30	11.52	1.80	20.22	7.42	7.09	5.70	5.80	2.85	9.85	1.37
Texas ...	1.42	0.18	0.94	0.43	1.84	4.34	0.36	4.53	3.21	4.55	2.47	4.93	4.44
Toowoomba ...	6.99	2.21	3.42	3.60	1.27	7.94	0.34	3.90	3.00	4.06	3.82	4.85	4.27
Warwick ...	4.61	0.63	2.69	2.13	0.73	8.62	0.10	5.45	2.63	3.41	2.89	3.92	2.73
Westbrook ...	3.37	4.21	2.70	1.52	0.34	4.23	2.53	3.89	1.63	3.89	4.03	5.11	3.75

* One day gauge overflowed.

EDGAR L. FOWLES,
For the Hydraulic Engineer.

PRICES IN BRITISH MARKETS OF ARTICLES WHICH CAN BE PRODUCED IN QUEENSLAND.

BUTTER.—Australian, choicest, 84s. to 94s.; New Zealand, 84s to 94s.; Danish, 110s.; Canadian, 92s. to 100s. per cwt.

CHEESE.—Canadian, 49s. to 54s. per cwt.

CONDENSED MILK.—18s. 6d. to 20s. 6d. per case, in 20-case lots.

SUGAR (duties, raw, 2s. to 3s. 10d. per cwt.; refined, 4s. 2d. and $\frac{1}{4}$ per cent.).—Refined, £16 to £17; raw, £12 to £15 per ton; German beet, 88 per cent., 8s. 1d. per cwt.

MOLASSES (duty, 2s. per cwt. and $\frac{1}{4}$ per cent.).—5s. 6d. to 8s. per cwt.

RICE (duty 5d. per lb.).—Rangoon, £9 to £13; Japan, £12 to £16; Java, £20 to £24; Patna, £16 to £18 per ton.

COFFEE (in bond, duty $1\frac{1}{2}$ d. per lb. and $\frac{1}{4}$ per cent.).—Ceylon plantation, 100s. to 120s.; peaberry, 60s. to 123s.; Santos, 28s. to 49s.; Mocha, 52s. to 100s.; Jamaica, 105s. to 130s. per cwt.

CHICORY ROOT, dried, duty paid (duty 13s. 3d. and $\frac{1}{4}$ per cent.).—24s. to 27s. per cwt.

ARROWROOT.—St. Vincent, $1\frac{1}{2}$ d. to $3\frac{1}{2}$ d.; Natal, 6d. to 8d.; Bermuda, 1s. 4d. to 1s. 6d. per lb.

WHEAT.—Duluth, 31s. 6d. to 36s. 3d. per 496 lb.; English, 30s. 6d. per 504 lb.; Australian, 32s. per 480 lb.

FLOUR.—28s. to 30s. 6d. per 280 lb.

MALTING BARLEY.—27s. 6d. to 30s. per 448 lb.; grinding, 21s. 6d. per 416 lb.

OATS.—New Zealand, 23s. to 28s. per 384 lb.

SPLIT PEAS.—39s. to 40s. per 504 lb.

GINGER.—Jamaica, 42s. to 65s.; Cochin, 42s. to 75s.; Japan, 26s. to 27s. per cwt.

VANILLA.—3s. to 7s. per lb.

PEPPER.—Capsicums, 18s. to 75s.; chillies, 38s. to 45s. per cwt.; black, $6\frac{1}{2}$ d. to $6\frac{3}{4}$ d.; white, $9\frac{1}{2}$ d. to 1s. $0\frac{1}{2}$ d. per lb.

GREEN FRUIT.—Apples, Australian, no quotation; Tasmanian, no quotation; American, 22s. to 28s. per case; bananas, 10s. to 14s. per bunch; pineapples, 3s. to 6s. each; oranges, Italian, 8s. 6d. to 17s. per 420; lemons, Naples, finest, 36s. to 40s. per 420; Messina, 13s. to 14s. per 330.

DATES.—Taflat, 70s. to 75s. per cwt.; Persian, 8s. to 10s. 3d. per case; Egyptian, 15s. to 25s. per cwt.

COTTON.—Uplands, $6\frac{1}{2}$ d. to $7\frac{1}{2}$ d. per lb.; Sea Island, $13\frac{1}{2}$ d.; Queensland (Carávonica, Cairns), 9d. per lb. offered.

COTTON SEED.—£6 7s. 6d. per ton.

COTTON-SEED OIL CAKE.—£6 5s. per ton.

COTTON-SEED OIL.—Crude, 17s. $10\frac{1}{2}$ d. to 21s. 9d. per cwt.

CANARY SEED.—67s. to 75s. per quarter of 480 lb. = 8s. 4d. to 9s. 4d. per bushel.

LINSEED.—33s. 6d. to 45s. 6d. per 416 lb.

LINSEED OIL CAKE.—£6 15s. to £7 2s. 6d. per ton.

LINSEED OIL.—£17 15s. to £18 18s. per ton.

OLIVE OIL.—£31 10s. to £33 per tun (252 gallons).

COPRA (cocoanut-kernel).—£15 to £16 per ton; £8 to £9 per ton at the S. S. Island trading stations. Corresponding value in Queensland, £10 to £12 per ton.

COCOANUT OIL.—£30 to £32 per ton.

LUCERNE SEED.—56s. to 60s. per cwt.

MANILLA HEMP.—£25 to £30 per ton.

NEW ZEALAND HEMP.—£32 per ton.

SISAL HEMP.—£35 per ton.

FLAX.—£48 to £52 per ton.

TAPIOCA (duty, 5d. per cwt.).—12s. 6d. to 18s. per cwt.

FROZEN MEAT.—The following are the Frozen Meat Trade Association's Smithfield market quotations for the undermentioned classes of frozen meat, based on actual sales of not less than 100 carcasses of mutton or lamb, or 25 quarters of beef of fair average quality. These quotations are not for selected lines, but for parcels fairly representative of the bulk of the shipments now on the market:—

New Zealand Sheep.

(Crossbred Wethers and Maiden Ewes.)

	Jan. 9.	Jan. 16.
Canterbury, light (48 lb. to 56 lb.)	4 $\frac{3}{8}$ d.	4 $\frac{3}{8}$ d.
Canterbury, medium (56 lb. to 64 lb.)	4 $\frac{3}{8}$ d.	4 $\frac{3}{8}$ d.
Canterbury, heavy (64 lb. to 72 lb.)	4 $\frac{3}{8}$ d.	4 $\frac{3}{8}$ d.
Dunedin and Southland (56 lb. to 64 lb.)	4 $\frac{1}{4}$ d.	4 $\frac{1}{4}$ d.
North Island (55 lb. to 65 lb.) ...	4 $\frac{1}{2}$ d.	4 $\frac{1}{2}$ d.

Australian Sheep.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	3 $\frac{5}{8}$ d.	3 $\frac{5}{8}$ d.
Light (under 50 lb.)	3 $\frac{5}{8}$ d.	3 $\frac{5}{8}$ d.

River Plate Sheep.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	3 $\frac{1}{16}$ d.	3 $\frac{1}{16}$ d.
Light (under 50 lb.)	3 $\frac{1}{16}$ d.	3 $\frac{1}{16}$ d.

New Zealand Lambs.

Canterbury, light (28 lb. to 36 lb.)	4 $\frac{1}{16}$ d.	4 $\frac{1}{16}$ d.
Canterbury, heavy (36 lb. to 42 lb.)	4 $\frac{1}{16}$ d.	4 $\frac{1}{16}$ d.
Dunedin and Southland (28 lb. to 42 lb.)	4 $\frac{1}{2}$ d.	4 $\frac{1}{2}$ d.
North Island (28 lb. to 42 lb.) ...	4 $\frac{3}{8}$ d.	4 $\frac{3}{8}$ d.

Australian Lambs.

30 lb. to 40 lb.	4 $\frac{1}{2}$ d.	4 $\frac{1}{2}$ d.
-------------------------	--------------------	--------------------

River Plate Lambs.

30 lb. to 40 lb.	None offering.
-------------------------	----------------

New Zealand Frozen Beef.

Ox, fores (180 lb. to 220 lb.) ...	2 $\frac{1}{2}$ d.	2 $\frac{1}{2}$ d.
Ox, hinds (180 lb. to 220 lb.) ...	3 $\frac{5}{8}$ d.	3 $\frac{5}{8}$ d.

(Quotations for New Zealand beef are nominal.)

Australian Frozen Beef.

Ox, fores (160 lb. to 200 lb.) ...	2 $\frac{3}{8}$ d.	2 $\frac{5}{16}$ d.
Ox, hinds (160 lb. to 220 lb.) ...	2 $\frac{3}{4}$ d.	2 $\frac{1}{16}$ d.

River Plate Frozen Beef.

Ox, fores (160 lb. to 220 lb.) ...	2 $\frac{7}{16}$ d.	2 $\frac{7}{16}$ d.
Ox, hinds (160 lb. to 220 lb.) ...	2 $\frac{7}{8}$ d.	2 $\frac{7}{8}$ d.

EGGS.—French, 12s. to 17s.; Danish, 12s. 9d. to 17s. per 120.

BACON.—Irish, 47s. to 55s.; American, 49s. to 54s. per cwt.; Canadian, 43s. to 50s. per cwt.

HAMS.—Irish, 80s. to 106s.; American, 55s. to 62s. per cwt.

TALLOW.—Mutton, fine, 28s. 9d.; medium, 26s. 9d. per cwt.; beef, fine, 28s. 6d.; medium, 26s. 6d. per cwt.

Agricultural Patents.

PATENTS ACCEPTED.

7171: John Bede Morony, of Mudgee, in the State of New South Wales, storekeeper. "A device for Preventing Horses or other Animals attached to Road Vehicles from Starting or Bolting." Dated 19th March, 1903.

7202: Walter Hussey German, of O'Connell street, Sydney, in the State of New South Wales, engineer. "An Improved Apparatus for Unloading Sugar-cane from Trucks." Dated 7th April, 1903.

7358: William Strawbridge, of Greenhill road, Burnside, State of South Australia, civil servant. "Improved Means and Apparatus for Trapping Rabbits and other Animals." Dated 6th July, 1903.

7372: George Edward Fortescue and Albert John Fortescue, of Tallangatta, Victoria, Australia, mechanics. "Improved Means for Forcing the Mixture from Rabbit Poison Distributors." Dated 18th July, 1903.

7397: Emma Jane Walker, of Brunswick street, New Farm, near Brisbane, Queensland, Australia. "Improvements in Cooling Safes or Containers for Comestibles and the like." Dated 31st July, 1903.

7502: John Edwin Palmer, of 5 Commercial Chambers, Manse street, Dunedin, New Zealand, gentleman. "Improved Compound for Branding Cattle, Horses, and the like Animals." Dated 8th October, 1903.

6955: James Robertson, of Maraeweka Station, Maheno, Otago, New Zealand, ploughman. "Improved Ditch Plough." Dated 15th November, 1902.

7112: Benjamin Parker, of Coimadai, Victoria, Australia, farmer. "Improved Method of and Means for Destroying Rabbits, Wild Dogs, Foxes, Rats, and other like Vermin." Dated 9th February, 1903.

7144: Richard Francis Gorman, of Warrmatta, New South Wales, farmer and grazier. "Improved Wire Straining Apparatus." Dated 2nd March, 1903.

7410: James Smith, of "Inglewood," Niangala, New South Wales, **farmer** and conditional purchaser. "Improvements in and relating to Tree and Stump Extractors." Dated 7th August, 1903.

7284: Niels Peder Willmann, of Wood street, Mackay, Queensland, Australia, agricultural implement manufacturer. "New or Improved Portable Means or Appliances for Loading or Unloading Sugar Cane to or from Trucks, Drays, or Wagons in the Field or elsewhere." Dated 26th May, 1903.

7092: Harvey P. Wellman, of the Federal Palace Hotel, 547 Collins street, Melbourne, Victoria, Australia, engineer. "An Improved Elevating Gate for farmers or others." Dated 3rd February, 1903.

SEED MAIZE—HICKORY KING.

Amongst the varieties of white seed maize imported from America, and which is now for sale by the Department of Agriculture, is "Hickory King." From an American source, we learn that this is a very valuable and reliable field corn, having a very large grain, and is the smallest cobbled pure white dent in the world. The grain is so large and the cob so small that, by breaking the ear in half, one grain will cover the entire end of the cob. The ears grow 7 to 9 inches in length, and $6\frac{1}{4}$ to $6\frac{1}{2}$ inches in circumference, and are generally borne 3 to 6 on one stalk, thus making it enormously productive. It ripens early, maturing in 110 days from planting. It is particularly adapted to, and will yield more in thin soils, than any other variety of field corn, and, if planted on good soil, will bear much closer planting than other varieties, as the stalks are of medium growth. Wherever it has been grown, it has given universal satisfaction.

General Notes.

GROWING FLAT CHINA PEACHES FROM SEED.

Mr. G. Monks, of Mount Pleasant, Gympie, in a letter on the above subject, revives the old legend that Flat China peaches cannot be raised from the seeds of the same variety. 'At one time in the dim past we held this belief, and refrained from even trying the experiment. When, however, we at last did so, the theory exploded, as we raised good Flat Chinas from Flat China seed. Mr. Monks has also experimented in the following manner: I determined, he says, to experiment in my own way, and, if possible, find out something of the mystery. Some five years ago I gathered 25 China Flat peach stones, and set them in soil in a box. I also set some common peach stones in another box. In the following spring, about August, I noticed the common peach stones sprouting up, but not a sign of the China Flats, so I gathered the China Flat stones out of the box, and passed each carefully through a vice, to crack the shell, as there was not any sign of a cleavage or bursting. I found that about 16 of the kernels were withered up or dead, but the remaining 9 possessed fully-developed kernels. These I replaced in the box, and in a few days the China Flats were sprouting up as vigorously as the common peaches, and these China Flat seedlings now bear fruit true to their kind. So it appears that there is a large percentage of dead seed from the China Flat peaches, and that the good stones required cracking to enable the kernels to grow. [Mr. S. C. Voller, Assistant Instructor in Fruit Culture, says the Flat Chinas will certainly grow from seed.—Ed. *Q.A.J.*]

NATAL WATTLE BARK FOR AUSTRALIA.

Australia has always been considered a sort of topsy-turvey land, where cherries grow with the stones outside, where trees shed their bark instead of their leaves, and decay from the inside instead of the outside; where the rivers run underground; where the birds do not sing, and some laugh; where fish climb trees, when frightened, instead of taking to the water (the Jumping Johnnies of the North); where animals carry their young in pouches, and where a great many other seeming absurdities, contradictions, and reversals of the order of Nature occur. But the most extraordinary thing we have yet heard of Australia is, that it is proposed in South Australia to import wattle bark from South Africa. Australia is the home of the wattle of several kinds. In all directions on the coast the wattle-tree grows in profusion, yet we find in the *Natal Agricultural Journal* the following letter, written by a South Australian firm to the Minister for Agriculture in that Colony:—

93 Currie street, Adelaide, South Australia,

27th October, 1903.

The Hon. Minister of Agriculture,
Pietermaritzburg, Natal.

DEAR SIR,—We are desirous of importing some Natal mimosa (or wattle) bark for tanning purposes. We should, therefore, be glad if you would kindly place us in communication with two or three reliable firms who are handling bark. In order to save time, we would be glad if you would get those firms to send us small samples and quotations c.i.f., Adelaide, Melbourne, and (or) Sydney.

Thanking you, &c.,

GEO. WILCOX & Co.

Surely this is "carrying coals to Newcastle." Mr. H. von Buelow, in his address to the Natal Association, of which he is president, said that "greater competition from Australia is to be expected by our wattle-growers." Yet, here we have an application from Australia for wattle bark!

TO PICKLE PORK OR HAMS.

Sprinkle the pork with salt, and let it stand for two days, drain, and rub with a little coarse sugar, afterwards packing the meat closely in the pickle, which should be prepared as follows:—Two gallons of cold water, 2 lb. of coarse sugar, 2½ lb. of common salt, ½ lb. of saltpetre, 2 lb. of bay salt. A deep glazed earthenware pan is best. This pickle will keep for a long time, and may be used over and over again. A large ham should remain in the pickle about three weeks; a small ham, about two weeks; a leg of pork, twelve days.

AUSTRALIAN WINES IN ENGLAND.

The following letter has been written to the London *Times* by Messrs. W. and A. Gilbey on the subject of the vintage of 1903:—The wine production of the British colonies has never had so much interest for British consumers as at the present time. Although, hitherto, there has been no resumption of shipments to the United Kingdom of wines from South Africa, which in 1859 amounted to no less than 781,581 gallons, but very shortly afterwards declined to vanishing point, importations from the Australian colonies have of late years shown a continually progressive increase, and it is confidently anticipated that the consumption of them in the United Kingdom will this year exceed 1,000,000 gallons. When Australian wines were first brought prominently before the British public their ready consumption was attributed in a great measure to the strong sentiment then growing up between the mother country and her colonies, but the ever-increasing sale of these wines clearly indicates that they possess a special merit of their own which will ensure for them a permanent place in the wine commerce of our Empire. We retain a special interest in the advancement of vine culture in the colonies, for the development of which there appears to us much scope in the future. A suggestion was made to us that the time was most opportune to invite some of the principal representatives of our colonies to witness in the Medoc the gathering and housing of this vintage. Amongst others we had the pleasure of entertaining at Chateau Loudenne the following:—Sir Robert Herbert, Sir Walter Buller, Sir John Cockburn, Sir Charles Howard, the Hon. H. B. Lefroy (Agent-General for Western Australia), and Mr. H. A. Grainger (Agent-General for South Australia). France being, above all other countries of the world, the best centre of applied viticultural science and practice, these gentlemen had, during their visit to us and at some of the principal chateaus of the Gironde, an opportunity of studying on the spot the methods and practice of the best French wine-growers, which, we trust, may not altogether be without utility to our colonial brethren over the sea engaged in the same industry.

SIBERIAN BUTTER.

The completion of the western section of the trans-Siberian railway has resulted in a remarkable increase in the exportation of butter. During five years the Siberian output has increased from 5,416,800 lb. to 90,280,000 lb.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

Answers to Correspondents.

MILLET SEED.

P. FINDLAY, Bowenville—

Question.—I am sending you a packet of millet seed, the name of which I would like to know, and also its use and value. I received the seed as "Giant Millet," but this must be a mistake, because I have this year grown an acre of it, and its height was from $2\frac{1}{2}$ to 3 feet. The crop was very healthy and heavy. I got 50 bushels of seed, which ripened, whilst the straw (rather coarse) was green enough for hay. The latter has cured well, and yielded between 3 tons to 4 tons per acre. I have not yet been able to determine whether it is good feed for stock or not, but it would make a good-looking and sweet-smelling chaff. The crop ripened in about three months from sowing.

Answer.—We have just grown a small quantity of the same kind of millet you send, and can bear out what you say about its habit of growth and quick ripening. It was given to us as "canary seed" of some kind. The true name is "Little Millet"; botanical name, *Panicum miliaceum* (millet-like). It is the oldest of millets, and was cultivated in the Stone Age in Switzerland, and in pre-historic times in Egypt. It is now grown nearly all over Europe, and thrives in Norway and Siberia. It is the best of poultry feed, is also good and nutritious for table use, and in Siberia syrup is made from the seeds. On good soil it will yield as much as 70 bushels of seed per acre. There should be a ready sale for it in this country.

NUMBER OF HENS TO A MALE BIRD.

J. H. CLARK-KENNEDY, Cardwell—

No definite numbers can be stated, as such must vary according to the circumstances under which poultry are kept. Confined in runs, the numbers must be smaller than when the birds are running at liberty. The number of hens per rooster also varies according to the variety kept, as the lighter breeds are more vigorous and are able to fertilise a greater number of eggs. Again, some birds are of stronger constitution than others. However, a general idea of the matter may be given, and it will be found that as a rule the lighter breeds, such as Minorcas and Leghorns, can be mated in the proportion of about seven or nine hens to the one male bird at the commencement of the breeding season, gradually increasing this number till towards the close as many as fourteen or sixteen may successfully be run. With the heavier breeds, as the Orpingtons and Wyandottes, it will be found injudicious to mate more than four or five hens with the cock at the beginning of the season, this increasing to ten or a dozen. As I stated above, these figures are only general, and may have, and probably will have, to be varied according to one's circumstances. The breeder must use his own experience to a great extent, and if he finds that the eggs are proving infertile he must reduce the number of hens. It is well to bear in mind, however, that it is quite possible to have too few hens in the breeding pen, and when this is the case the eggs are equally as liable to be infertile. When it is seen that the backs of the birds are becoming bare, it may be taken as an almost certain sign that the cock has not plenty of hens mated with him, and the numbers must be increased.

With regard to turkeys, the exact number of hens varies, of course, with the condition and with the breed, besides which the age of the cock has a good

LITTLE MILLET. (*Panicum Miliaceum*.)

deal to do with it. Unlike fowls, one union with the turkey cock is sufficient to fertilise the whole clutch of eggs; at the same time, however, if the number be too great, the progeny will prove weakly and slow in growth, and will not attain a well-developed frame. In some parts of the country it is the custom for the farmer to keep a turkey cock, and the cottagers and others living in the neighbourhood are in the habit of sending their hens to him to be served. The same plan is adopted, in fact, as with a stallion, save, of course, that the turkey never travels, but always remains at the homestead. Three ducks to one drake may be successfully run together early on in the season, increasing this number to five as the spring approaches. A useful number for a pen is that termed by the duckers in the Aylesbury district a "set," consisting of ten ducks and three drakes. With geese, the number varies so greatly that it is somewhat misleading to quote any numbers; but, speaking very generally, three or four geese may be mated with the one gander.

STONE FRUIT TREES RUNNING TO WOOD—TO BANISH SILVER FISH—WHEN TO PLANT POTATOES IN THE ROMA DISTRICT.

VICTOR E. WEHL, Linwood, Roma.—

1. Mr. A. H. Benson advises a severe summer pruning now, as this will tend to develop fruit and check the growth.
2. Try Pyrethrum or Persian Insect Powder. It will kill all insects except with those with hard shells or wing cases.
3. Plant potatoes at the end of February and July.

TO MAKE A FOSTER-MOTHER.

E.B., Farmer, Toowoomba.—In Mrs. Lance Rawson's bulletin on Practical Poultry Farming, we find the following:—Get two soap boxes, and procure a small bedroom lamp. This is to be placed on the ground, and one box turned over it, a square hole being made in the top (or what is really the bottom of the box) to admit of the lamp glass. Over this opening, through which the lamp glass just comes, place an old tin billy, perforated round the sides here and there. Now, turn the other box over the first, making a little doorway for the chickens to run in and out, and place a step or little ladder to enable them to get up to the door. The lamp need not be turned very high to make the place warm enough. They soon get to understand, and will nestle round the billy quite happily. This is the most simple foster-mother for very young chickens that I know of. When they are three weeks or a month old, a box, in which strips of flannel and old tweed are tacked, is sufficiently warm for them.

SUNFLOWER SEEDS—TOMATOES—ORANGE-TREES CUT BACK—CHEAP WINNOWING MACHINE.

JUMBO, Bowen.—The seeds require no preparation beyond winnowing. When ripe, the heads should be dried quickly, to avoid mouldiness in the fleshy parts and on the seeds. As soon as dry enough, they can be threshed, winnowed, and bagged. See articles on sunflowers in this *Journal*, Vol. V., p. 352; Vol. X., p. 338; Vol. XI., p. 129.

TOMATOES.

The time from sowing of seed to fruit-bearing will vary from three to four months, according to soil, season, and climate.

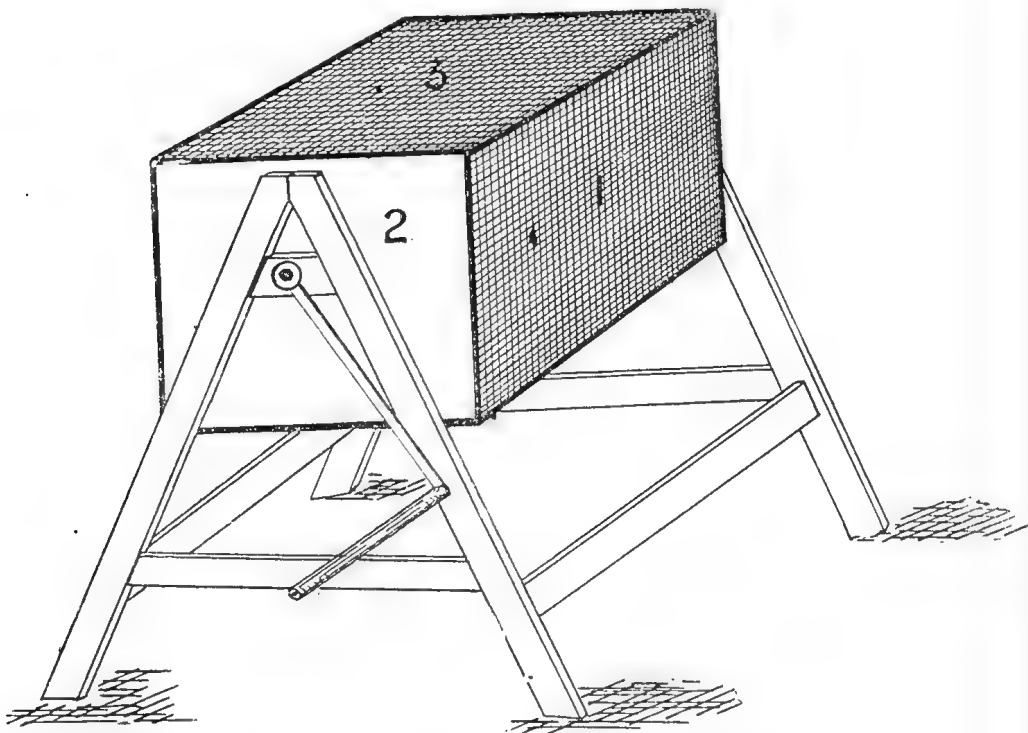
ORANGE-TREES CUT BACK.

Orange-trees cut back, but *not* below the graft, will show growth and foliage of the variety grafted on to the stock, whatever that may be. Cut below the graft, shoots from seedling orange stocks will grow strong, with large thorns;

orange leaf shows sub-leaf at base of main one. Mandarin shows none. Lemon can be distinguished easily by texture and colour of leaf and smell, by a little observation. Pomelo foliage is very much heavier than orange, thick and dark-coloured. Grower can easily rebud on a selected stock shoot, if desired. Would advise lemon stocks used for oranges to be replaced by orange.

CHEAP WINNOWING MACHINE.

Mr. H. R. Stephens, Toowoomba, to whom we are indebted for many common-sense ideas in agricultural machinery, supplies the following suggestion for a cheap winnowing machine for seeds:—The machine consists of a square box 18 in. by 18 in. All sides, except Nos. 2 (and 4 invisible in diagram), are enclosed in wire mesh suitable to the seed to be winnowed.



Thus No. 1 and its opposing side, as well as the door No. 3, are wire-gauzed. The machine rests on trestles, and is turned by hand—or windmill—power. Provision for catching the seed may be made underneath, either by a tray or merely a tarpaulin on the ground. The sifter should not be filled with seed.

HORSE WITH SORE BREAST.

J. BRITTON, Enoggera.—Bathe the shoulders for an hour, night and morning, with warm water, and then apply a lotion made up of 1 ounce of tincture of myrrh, 2 drachms of alum, and 6 ounces of water; mix well, and apply it after each bathing with warm water. Anywhere the skin is broken apply the lotion. Whatever collar you use, see that it fits properly, and is well "lined." Do not work him in a collar until he is quite well.

CARROTS FOR STOCK.

LEX.—Carrots have a very high feed value for all stock. Can be either fed raw, boiled, or steamed, or mixed with other root crops, chaff, or crushed grain. They make up a good ration steamed with chaff and crushed grain for horses or cattle. For pigs they can be fed almost any way.

AMERICAN POTASH.

A. LEUMANN, Aloomba.—The American potash is, we are informed by Mr. P. R. Gordon, late Chief Inspector of Stock, a trade secret. The compound was tried here, and proved a failure.

THRESHING PASPALUM—ONIONS.

W. O'KEEFFE, Wondai.—The best way to thresh *Paspalum dilatatum* is with a pegdrum thresher, failing which a very good way would be to put the heads of the grass into a bag and thresh with supple stick or cane.

Horton's Long-keeping Brown Spanish is now considered one of the best onions.

New P. Silverskin is an onion for which there is always a good market. Messrs. Harrison and Co., Fortitude Valley, will give 1d. per lb. for all they can purchase. Onions do equally well sown broadcast or transplanted.

GRASSES FOR PASTURE.

E. SWAYNE, Mackay.—In an open climate such as Mackay, I would not recommend a mixture of grasses. On the undulating scrub lands it has been proved that, for dairy purposes, two grasses will be found to act well, but they should be grown separately—couch and *Paspalum dilatatum*.

Times of Sunrise and Sunset, 1904.

DATE.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		PHASES OF THE MOON.
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	
1	4:57	6:45	5:21	6:42	5:42	6:19	5:58	5:46	3 Jan. ☉ Full Moon 3 47 p.m.
2	4:58	6:46	5:22	6:42	5:42	6:18	5:59	5:45	10 " ☾ Last Quarter 7 10 a.m.
3	4:58	6:46	5:22	6:42	5:43	6:17	6:0	5:44	18 " ☿ New Moon 1 46 "
4	4:59	6:46	5:23	6:41	5:44	6:16	6:0	5:43	26 " ☽ First Quarter 6 41 "
5	5:0	6:46	5:24	6:40	5:44	6:15	6:0	5:42	
6	5:0	6:46	5:24	6:40	5:44	6:14	6:1	5:40	
7	5:1	6:47	5:25	6:39	5:45	6:13	6:1	5:39	2 Feb. ☉ Full Moon 2 33 a.m.
8	5:2	6:47	5:26	6:38	5:45	6:12	6:1	5:38	8 " ☾ Last Quarter 7 56 p.m.
9	5:3	6:47	5:27	6:37	5:46	6:11	6:2	5:37	
10	5:3	6:47	5:28	6:36	5:47	6:10	6:2	5:36	16 " ☿ New Moon 9 4 "
11	5:4	6:47	5:29	6:35	5:47	6:9	6:3	5:35	24 " ☽ First Quarter 9 8 "
12	5:4	6:48	5:29	6:35	5:48	6:8	6:4	5:34	
13	5:5	6:47	5:30	6:34	5:49	6:7	6:4	5:33	
14	5:6	6:47	5:30	6:34	5:50	6:6	6:5	5:32	2 Mar. ☉ Full Moon 0 48 p.m.
15	5:7	6:47	5:31	6:33	5:50	6:4	6:5	5:31	9 " ☾ Last Quarter 11 0 "
16	5:8	6:47	5:32	6:32	5:51	6:3	6:6	5:30	
17	5:9	6:46	5:32	6:32	5:51	6:2	6:7	5:29	17 " ☿ New Moon 3 39 "
18	5:10	6:46	5:33	6:31	5:51	6:1	6:7	5:28	25 " ☽ First Quarter 7 36 a.m.
19	5:11	6:46	5:34	6:30	5:52	6:0	6:7	5:27	31 " ☉ Full Moon 10 44 p.m.
20	5:11	6:46	5:35	6:29	5:52	5:59	6:8	5:26	
21	5:12	6:46	5:35	6:28	5:52	5:58	6:9	5:25	
22	5:12	6:46	5:36	6:27	5:53	5:57	6:9	5:24	8 April ☾ Last Quarter 3 53 a.m.
23	5:13	6:46	5:37	6:26	5:54	5:56	6:10	5:23	16 " ☿ New Moon 7 53 "
24	5:14	6:45	5:38	6:25	5:54	5:55	6:10	5:22	
25	5:15	6:45	5:39	6:24	5:55	5:54	6:11	5:21	23 " ☽ First Quarter 2 54 p.m.
26	5:16	6:44	5:40	6:23	5:55	5:53	6:11	5:21	30 " ☉ Full Moon 8 36 a.m.
27	5:17	6:44	5:40	6:22	5:55	5:52	6:12	5:20	
28	5:18	6:44	5:41	6:21	5:56	5:50	6:12	5:19	
29	5:19	6:43	5:41	6:20	5:57	5:49	6:13	5:18	
30	5:19	6:43	...	...	5:57	5:48	6:13	5:17	
31	5:20	6:42	...	...	5:58	5:47	...	...

The approximate times for sunrise and sunset at Rockhampton, Townsville, and Cooktown may be obtained by using the table for Brisbane, and adding the following figures:—

1904.		ROCKHAMPTON.		TOWNSVILLE.		COOKTOWN.	
		Rise.	Set.	Rise.	Set.	Rise.	Set.
January	...	18 m.	2 m.	42 m.	12 m.	53 m.	9 m.
February	...	15 m.	5 m.	36 m.	18 m.	44 m.	18 m.
March 1 to 20	...	11 m.	9 m.	29 m.	25 m.	35 m.	27 m.
" 21 to 31	...	9 m.	11 m.	28 m.	26 m.	29 m.	33 m.
April	...	7 m.	13 m.	20 m.	34 m.	21 m.	41 m.

The Markets.

PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	JANUARY.	
	Prices.	
Apples, Eating, per packer	2s. to 6s.	
Apples, Cooking, per case	2s. to 6s.	
Apples, American, Eating, per case ... ..	...
Apples, American, Green ... ..	...
Lemons, Italian, per 150 to 180 ... ..	...
Lemons, Italian, per 150 to 180	10s.	
Lemons, American, per 180	7s. to 8s.	
Lemons, New South Wales, per case	5s.	
Oranges, Italian, per 180 ... ..	...
Oranges, Local, per case ... ..	...
Oranges, Sydney (packers), per case ... ..	...
Mandarins, Local (indifferent) ... ..	...
Mandarins, Sydney (packers) ... ..	...
Apricots, New South Wales, boxes (half-gincase)	1s. 6d. to 4s.	
Apricots, Queensland, half-case	1s. 6d. to 3s.	
Plums, half-gincase	9d. to 3s. 6d.	
Peaches, half-gincase	1s. 6d. to 3s. 6d.	
Nectarines, half-gincase	4s.	
Gooseberries, English, per quarter-case ... ..	...
Cherries, per quarter-case	5s. 6d.	
Passion Fruit, quarter-case	1s.	
Mangoes, per case	4s.	
Pineapples, rough, per dozen	2s. 3d.	
Pineapples, Queen	6s.	
Melons, per dozen	2s. to 5s.	
Rockmelons	2s. 6d.	
Bananas, per bunch	1s. 6d.	
Bananas, per dozen	2½d.	
Tomatoes, quarter-case	4d. to 1s.	
Papaw Apples, quarter-case	1s. 6d.	
Custard Apples, quarter-case ... ..	...
Granadillas, case ... ..	...
Seville Oranges, apple-case ... ..	...
Cape Gooseberries, per quart ... ..	...
Pears (Melbourne), export case	9s. to 10s.	
Pears (Tasmanian), quarter-case ... ..	...
Pears (China), Local, per case ... ..	...
Rosellas, per sugar-bag ... ..	...

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR JANUARY.

Article.	JANUARY.	
	Prices.	
Bacon (Pineapple)	lb.	7½d. to 8½d.
Barley (Malting)	bush.	2s. 6d. to 3s. 3d.
Bran	ton	£2 to £3 5s.
Butter, Factory	lb.	8½d. to 8¾d.
Chaff, Mixed	ton	£1 5s. to £2 17s. 6d.

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR
JANUARY—*continued.*

Article.							JANUARY.
							Prices.
Chaff, Oaten ... ..	...	...	...	...	...	ton	£3 15s. to £4 5s.
Chaff, Lucerne ... ..	...	...	...	...	...	"	£1 5s. to £2
Chaff, Wheaten ... ..	...	...	...	...	...	"	£1 15s. to £3
Cheese ... ..	...	...	...	...	...	lb.	6d. to 7½d.
Flour ... ..	...	...	...	...	...	ton	£8 to £12
Hay, Oaten, Hydraulic ... ..	...	...	...	...	...	"	£5 to £5 15s.
Hay, Lucerne ... ..	...	...	...	...	...	"	£1 6s. 8d. to £1 8s. 4d.
Honey ... ..	...	...	...	...	...	lb.	1½d. to 1¾d.
Maize ... ..	...	...	...	...	...	bush.	2s. 10d. to 3s. 3d.
Oats (Victorian) ... ..	...	...	...	...	...	"	2s. 7d. to 2s. 9d.
Pollard ... ..	...	...	...	...	...	ton	£3 10s. to £4 5s.
Potatoes ... ..	...	...	...	...	...	"	£2 10s. to £3
Potatoes, Sweet ... ..	...	...	...	...	...	cwt.	2s. 7d.
Pumpkins ... ..	...	...	...	...	...	ton	£1 to £1 5s.
Wheat, Milling ... ..	...	...	...	...	...	bush.	2s. 6d. to 3s. 3d.
Wheat, Chick ... ..	...	...	...	...	...	"	2s. 6d. to 3s. 1d.
Onions ... ..	...	...	...	...	...	ton	£3 to £5
Hams ... ..	...	...	...	...	...	lb.	1s. to 1s. 1d.
Eggs ... ..	...	...	...	...	...	doz.	8d. to 1s. 3¼d.
Fowls ... ..	...	...	...	...	...	pair	1s. 10d. to 5s.
Geese ... ..	...	...	...	...	...	"	5s. 3d. to 8s.
Ducks, English ... ..	...	...	...	...	...	"	2s. 6d. to 4s. 3d.
Ducks, Muscovy ... ..	...	...	...	...	...	"	3s. 6d. to 6s. 7d.
Turkeys, Hens ... ..	...	...	...	...	...	"	5s. 4d. to 8s. 9d.
Turkeys, Gobblers ... ..	...	...	...	...	...	"	9s. to 24s.

Orchard Notes for February.

By ALBERT H. BENSON.

As this month is usually a more or less wet one, especially in coastal Queensland, the cultivation of the orchard is apt to become somewhat neglected, owing to the inability of working the land; and a heavy crop of weeds of all kinds is the result. If possible, the weeds should be kept down when young by means of one or two horse cultivators fitted with surface-working knives; but, if the weather prevents this from being done, no great harm will take place if the weeds are mown down before they go to seed. The trash so obtained should be ploughed in, and will tend to maintain the supply of organic matter in the soil, and this, as has been stated frequently in this *Journal*, is of the greatest importance, as, besides rendering the soil more friable and easier to work, it increases the power of the soil to retain moisture, a most important consideration in a climate as changeable as this. In drier districts the orchard should receive good cultivation after every rain, as by this means the growth of weeds will be prevented and the greatest amount of moisture will be retained in the soil. In dry districts where irrigation is available, all citrus trees should receive a thorough soaking during the month, unless there has been a fall of several inches of rain, as a soaking now will carry the fruit on to maturity, provided that it is followed by cultivation. In irrigating fruit trees, always give a watering, say equal to 4 inches of rain all over the orchard; as this is infinitely better than giving a number of surface waterings. One soaking irrigation saturates every part of the soil, and will last for two or three months if followed up by proper cultivation; but surface waterings dry up in a few days, and unless kept up do more harm than good. In many cases, surface waterings induce the growth of surface roots, and unless these surface roots are kept well supplied with moisture they will die off, and more harm than good will be done to the tree. On the other hand, when the land is well saturated, the roots strike down, and are therefore less likely to dry out or be affected by sudden changes. The marketing of fruit still continues an important branch of orchard work. The main crop of rough-leaved pines, besides mangoes and bananas, in the Southern coastal districts, as well as the later varieties of plums and apples in the Stanthorpe district, have to be disposed of. As stated in last month's notes, every care should be taken to place the fruit on the market in as neat and attractive a manner as possible, and to see when packing it that it is free from fruit fly, San José scale, or other disease. I am sorry to say that few growers realise the importance of proper packing, as a large proportion of the locally grown fruit that comes to market is put up in anything but an attractive form. Clean cases, even grading, and neat packing always take the eye of the buyer; and fruit so got up will pay the grower handsomely for the extra trouble he has been put to, and not only that, should the market be glutted, fruit so got up will always find a sale when other fruit marketed in a slovenly manner is unsaleable.

February is a good month for transplanting mangoes and other tropical and subtropical fruit. The ground should be in thorough order, and dull or showery days should be chosen for the work; if this care is taken, there will be little risk or failure. Plant mango seeds either in nursery row for working over next year, or, if seedlings are wanted, then in the position they are to occupy permanently. In selecting mango seeds for trees to stand permanently, choose none but those obtained from the very best fruit—fruit that is of fine flavour, large size, handsome appearance, as free as possible from fibre, as well as being a prolific variety and strong grower.

Budding of both citrus and deciduous trees can be continued during the month, and the nursery will require constant care to keep it free from weeds, to see that all ties are cut, and all buds properly started and tied up; as, unless the young tree is properly started and trained to a single stem in the nursery, the grower has considerable difficulty in getting it to grow into a decent tree when it is permanently planted out in the orchard.

Strawberry planting should commence during the month. The land, which should be a rich loam of moderately heavy texture, if possible, should be well prepared by thorough working to a depth of at least 12 inches. If the land is virgin scrub, no manure will be necessary; but if it has been under crop for some time it should receive either a good dressing of well-rotted farm manure or of a commercial fertiliser rich in phosphoric acid, potash, and nitrogen.

Choose moist, showery weather for planting strawberries, and take care to set out nothing but strong, healthy runners. If the land is dry at time of planting it will require irrigating, and this is best done by opening up a furrow in which the plants are to be set, and filling it with water. As soon as the ground has soaked up the water, set the plants in the furrow and cover them with the dry soil. This method of watering will be found far better than setting the plants in dry ground and watering afterwards; as the moisture is all at the roots of the plants, and the dry soil that is placed on the top acts as a mulch and prevents the soil from drying out. Where leaf blight is troublesome—viz., wherever the Marguerite is grown—all plants should have all old diseased leaves removed, and the crowns and young growth should be dipped in Bordeaux mixture, taking care that the Bordeaux mixture is made from the best bluestone and not from an inferior article, as the cheap bluestones contain more or less sulphate of iron, and this will destroy the bulk of the plants dipped into a solution of which it forms a part.

The best strawberries to grow are—

1st, for early box berries—Aurie and Marguerite.

2nd, for mid-season box berries—Aurie, Marguerite, Federator, Pink's Prolific, and Trollope's Victoria.

3rd, for jam—Pink's Prolific, Trollope's Victoria, and Marguerite, though the later has not the colour of the former.

Farm and Garden Notes for March.

FARM.—Take every opportunity of turning up the ground in readiness for sowing and planting. The main crop of potatoes should be at once planted. As the growth of weeds will be slacking off, lucerne may be sown on deeply-cultivated soil. The latter should be rich and friable, with a porous subsoil, and should be thoroughly pulverised; do not waste time and money in trying to grow lucerne on land with a stiff clay subsoil. The land for lucerne should be prepared a couple of months before sowing, care being taken to cross-plough and harrow before the weeds have gone to seed. This ensures a clean field. Sow either broadcast or in drills. In the former case, 20 lb. of seed per acre will be required; in the latter, 10 lb. A good stand of lucerne has been obtained with less quantities. Lucerne seed is worth from 56s. to 65s. per cwt. in the British market. Should weeds make their appearance before the plants have sent down their tap-roots, mow the field. Before they can again make headway enough to do damage, the lucerne will be strong enough to hold its own against

them. Harrow and roll the land after mowing. Gather all ripe corn. It is too late to sow maize, even 90-day, with any certainty of harvesting a crop of grain. Rye grass, and prairie grass, oats, barley (in some districts, wheat), sorghum vetches, carrots, mangolds, and swede turnips may be sown. In Northern Queensland, sow tobacco seed, cow-pea, Carob beans, sweet potatoes, opium poppy, &c. Sow anatto, Jack fruit, and plant kola nut cuttings. Some temperate zone vegetables may be planted, such as:—Egg plants, potatoes, &c. Coffee-planting may be continued. Harvest Kafir corn and paddy.

VEGETABLE GARDEN.—As this is the month during which a very large variety of vegetables may be sown, a few brief notes on some of them will be of interest and use, especially to new beginners. Some vegetables may be sown where they are to remain and produce a crop, but most of them are best raised from seed in seed beds, to be afterwards transplanted. The seed beds require careful preparation. The soil should be a friable sandy loam, and must be as clean as deep cultivation, the removal of roots, and the destruction of weed seeds can make it. It must be fairly rich, or must be made so with well-rotted manure or leaf-mould. A clayey soil is to be avoided, yet it should not readily fall away from the roots when the plants are lifted. A light shade of bush material should be provided, not dense, but just sufficient to allow the broken sunlight to fall on the young seedlings. Ti-tree boughs are the best for this purpose. They can be supported on forked sticks and saplings. As the plants grow, the shade should be reduced, otherwise they will, in seeking the light, grow up spindly and weak, and no such seedling will ever make a satisfactory plant. Sow the seeds thinly in drills, and instead of raking them over, which process often results in the seeds being dragged into a heap, shake fine leaf-mould thinly over them, bearing in mind that vegetable seeds should not be covered deeper than their own diameter. When watering, do so in the evening and next day, stir the soil gently between the drills to prevent the possibility of the soil baking.

Broad Beans.—This vegetable likes a stiff, deeply-cultivated soil, well-drained and heavily manured. Mark out the rows 2 feet apart if a dwarf variety is sown, and 3 feet apart for the tall sorts. Set each seed 5 inches apart in the rows. About 4 quarts of seed will be sufficient for an acre. As soon as the beans are set, nip off the tops of the plants to make them throw all their energy into maturing the beans.

French Beans.—These may be sown at the same distances apart as broad beans, but the soil should be lighter and warmer than for the latter; 2 quarts are sufficient for 1 acre. They may be covered 1 inch deep, and as they grow, hill them up. This helps to retain moisture and to support the plants. The running or climbing varieties should have their runners cut, to throw strength into the pods.

Beets.—Sow the seeds where there is abundance of light and in the position where they are to mature. If necessary, however, they may be transplanted. The soil must be dug deeply, and even trenched two spades deep, digging the manure deep down to induce the tap-root to go down in search of the food, of which they take up great quantities. Beets are a very exhausting crop. Mark out rows 18 inches apart, scatter a little fine soil along these rows and sow the seed on it as thinly as possible, because the plants will have to be thinned out to 9 inches apart from plant to plant. The seeds should be steeped for 12 hours in cool water, and be sown whilst still damp. Cover to about half an inch. Two ounces of seed are required for an acre.

Broccoli.—Broccoli thrives admirably in this State, but it will not grow properly in the hot summer months. It requires a rich, deep, light soil, and should never be planted on ground which has previously been under any of the cabbage family. The seed bed should not be shaded by trees, the movable shade above mentioned is all that is needed. When planting out place the plants about 2 feet to 2 feet 6 inches apart. White and Purple Cape, Grange's

Early White, and Elletson's Mammoth are good varieties. Two ounces of seed will suffice for an acre.

Brussels Sprouts.—This excellent vegetable thrives best in the cooler portions of the State, such as the Darling Downs. It is best grown on poor soil. The plant rises up with a very long stem. The top leaves form a spreading head. The large leaves should be broken down to facilitate the formation of the little cabbages which are produced from the axil of every leaf. Heavy manuring should be avoided, as it causes loose, tasteless sprouts to be formed. The sprouts should be gathered when they have the appearance of half-blown roses. Plant out in rows 3 feet apart with 2 feet between the plants in the rows. Two ounces of seed will sow an acre.

Cabbage.—The magnificent cabbages seen at the various shows afford ample evidence that the climate is admirably adapted for their production. Cabbages love a deep, rich, open soil. Give them plenty of manure and frequent watering. The seed may be sown broadcast and thinned out afterwards, but generally it is preferable to sow in seed-beds and transplant. Sow in drills and cover lightly with leaf-mould. Then water gently. When the seedlings are from 4 to 6 inches high transplant them into rows from 18 inches to 2 feet apart according to varieties. It is well to snip off the extreme ends of the roots before planting out. Digging between the growing crops will be of great advantage in keeping the soil loose. After digging, draw some soil up to the stems of the plants. Mulching, liquid manure, and a little lime are all factors in producing large, well-flavoured cabbages. St. John's Day, Early York, London Market, Sugar Loaf, King, Flat Dutch are good early and medium sorts, whilst for late crops Schweinfurt and Drumhead are suitable.

Savoy Cabbage does well here. Its cultivation is the same as that for ordinary cabbage. Dwarf Green, Curled, and Drumhead are the varieties usually grown.

Cauliflowers.—For the cultivation and treatment of cauliflowers, see Part I. (Jan., 1904) of this *Journal*.

Carrots.—The carrot requires a light, rich, sandy loam of considerable depth, which should be dug two spades deep. The ground should have been heavily manured for a previous crop; thus the manure will be evenly distributed throughout, and good clean carrots will result. Get the surface of the ground fine, and sow either broadcast or in drills. As the seed is liable to hang together, it should be well rubbed in the hands, mixed with sand to separate it previous to sowing, and, as it is very light, it should be sown on a calm day. On light soil, not subject to binding in wet weather, the seed should be gently and evenly trodden or rolled in, and then raked. On land of a more retentive nature, it should be raked in only. Thin the plants out to 5 or 6 inches apart, and ply the hoe freely to keep down weeds and stir the soil. Early Horn is a fine-flavoured carrot, and, on account of its habit of growth, is adapted for cultivation in soils which would be too shallow for other varieties. The Intermediate, Long Orange, and Altringham are suitable for deep soils, and the latter and the White Belgian are excellent food for cattle and horses.

Celery.—A good, deep, rich vegetable mould, in a moist situation, is that most suited for celery. For the seed bed or box, make up a mixture of fine loam, leaf-mould, and sand. Sow the seeds thinly, cover very lightly, preferably with sifted stable droppings or decomposed manure, and slightly shade them. When the plants are up and the rough leaf is a little advanced, prepare a bed by mixing 2 inches in depth of well-rotted manure with about 3 inches of the soil. Level the surface, water thoroughly, and, a few hours afterwards, in the evening, plant out the seedlings 5 or 6 inches apart. Slightly shade them, and then prepare a similar bed for planting out for succession. For the final planting, throw out trenches 1 foot broad and 1 foot deep, at 5 feet apart from centre to centre. At the bottom, lay 4 inches of well-rotted manure, and

dig it in with a fork. Give the whole a good soaking with water. Now take up your plants, being careful to leave a ball of earth on the roots. Now take a stiff piece of brown paper, and make a collar or case, and wrap it round the lower part of the plant, leaving the top free. As the plant grows, this can be lifted. The object of this is to enable you to heap in the soil against the plants, without any of it getting inside them. Keep on drawing the earth up to them, to within 6 inches of the top. This must always be done in dry weather. Give plenty of water, and occasionally some liquid manure. A little salt sprinkled on the soil once or twice, followed by a good watering, will be beneficial. One ounce of celery seed will be sufficient to plant out an acre. We have blanched celery by letting the plants grow to 1 foot or 15 inches, and then enclosing them in an earthenware drain pipe. The whole of the plant inside the pipe was perfectly blanched.

Onions.—A rich, mellow soil, with a dry subsoil, is what onions demand. Give the ground a deep digging in January or February, with a good supply of manure, leaving it as rough as possible. At the end of February, give the ground a good dressing of soot and ashes, and dig it over, breaking all the lumps. Throw it up into beds of convenient width, and sow rather thickly in drills 1 foot apart and 1 inch deep. Tread the seed in firmly, and rake over lightly. When the plants are 6 inches high, transplant into beds similarly prepared, into rows 15 inches apart and 8 inches from plant to plant in the rows. In transplanting, only the root must be placed in the ground, the little bulb must be above it. By planting deep, the proper development of the bud is prevented. Keep the ground perfectly clean during all the growing time, and when the leaves begin to turn yellow bend down the tops just above the bulb to facilitate ripening. Onions may also be sown in drills and thinned out to 8 or 9 inches between the plants, the plants which are removed being used either to fill up misses or to form new beds. About 8 ounces of seed will serve for an acre. The best time to plant out onions is April, but splendid crops have been got by sowing in September.

Leeks.—Leeks may be treated when transplanted from the seed bed in the same way as celery—namely, by planting in trenches and earthing up. The leaves may be shortened back two or three times during the growing season.

Lettuce.—Sowings of lettuce may be made monthly for succession in seed beds. In very rich soil, lettuce may be sown and afterwards thinned out to 15 inches apart. Cos lettuce may be blanched by tying the plant round with banana-fibre, bringing the top to a point, so as to prevent the rain entering.

Endive.—This salad plant may be cultivated and treated like the lettuce.

Garlic.—Garlic, like eschallots, is propagated from the young bulbs. They should be planted in the winter. Press the lower half of the bulbs into the soil. Leave them in this state, without covering, until the spring. Then, when hoeing, draw the soil over them, so as to form a level surface. The soil that suits onions will also suit garlic.

Eschallots.—These may be propagated throughout the year by division of the roots. Plant in the same way as onions, in rich, sandy soil, and keep them well watered. By planting them on the top of small ridges, the roots only will be in the ground, and the bulbs will develop like small onions.

Parsnips.—These are cultivated in the same way as carrots. They take a long time to come to maturity.

Peas.—Peas may be sown from January to May, and even later. Yorkshire Hero, sown in May or June, is an excellent cropper. They require a rich, light, well-drained soil. They should not be sown too thickly. The dwarf sorts should be sown in drills 2 feet 6 inches asunder, the peas being thinned out to 5 or 6 inches apart in the rows. The very tall varieties should be planted 8 feet apart, and two rows of cabbages may be grown between.

Kohl-rabi.—This excellent vegetable is not appreciated in Queensland as it should be. It is really a turnip-rooted cabbage. It should be planted on heavily-manured land, 18 inches apart each way. The bulbous portion of the root above ground and the youngest leaves are eaten. They should be gathered quite young, as the turnip-like flesh inside toughens with age.

Spinach.—Sow thinly in well-dug, well-manured land, in drills 18 inches apart, and thin out to 9 inches apart, using the young plants for table. When the plants are well developed, keep on using the outside leaves for culinary purposes until the flower stalks appear. The prickly spinach is the most hardy and best suited for the winter crop—the round variety for the summer crop.

Radish.—Sow occasionally throughout the year, on rich soil. Sow thickly, and thin out as they come on. Make sowings about every fortnight for a succession.

Rhubarb.—Rhubarb roots are so easily procurable from seedsmen that we do not advise market gardeners to go to the trouble of raising plants from seed. If the seeds are sown in August, it will be June before the roots are ready to plant out for good. Plant the roots 2 feet apart each way, in very rich, moist soil, free from stagnant water below. Water occasionally while growing with a weak solution of guano, liquid manure, or soapsuds. Cut the flower stems as they appear. Should they appear during the first year, it is a sign that the ground is not rich or strong enough or has been badly prepared. Mulch during the hot weather.

Artichoke (Jerusalem).—Jerusalem artichokes are propagated like potatoes. They will thrive in any situation, and spread so much as to become troublesome to eradicate. Plant in the spring, but even in February and March if tubers have not been available before those months. Plant 15 inches apart, in rows 3 feet apart.

Artichoke (Globe).—This is another of the vegetables neglected in Queensland. The plant is propagated by means of suckers, which are planted early in spring, when about 10 inches high, in rows 4 feet apart, and 3 feet from plant to plant, in deep, rich, moist loam, well manured. The situation should be open. Shade with large pots, and water freely in dry weather. In October, remove all small suckers, and mulch the ground with 3 inches of manure. The beds will last five years.

Asparagus.—For asparagus beds, the very best soil must be chosen. The best is a good, deep, sandy loam, dug deep, and well manured. A sprinkling of salt should be added to the surface a month or two before the planting season. Just before planting, the ground should have another good dressing of well-rotted manure, be again trenched, at least 2 feet deep, and again well sprinkled with salt. During May or June, mark out the beds 4 feet wide, running north and south. Cut a trench 6 inches deep perpendicular about 9 inches from the side; against this place the plants, at 15 inches asunder, with great care, spreading the roots out, and leaving the crowns 2 inches below the surface. Fill in the earth quickly to avoid too long exposure. Now make two other rows in the same manner, and the bed is complete. Until the plants are established, give them plenty of water in dry weather. From September, right through the summer, apply liquid manure plentifully, twice a week, and also give a dressing of salt every month. In May, cut the stalks down, and dig the beds lightly over with a fork, at the same time digging up the paths between them. For the winter, cover the beds with a good dressing of manure. Begin to cut in September, using a long knife, and cutting below the surface. To ensure the tender shoots being well blanched, the European growers place earthen pipes or wooden tubes, about 1 foot long, over them.

Herbs.—No vegetable garden is complete without herbs. These are generally easy to raise from seed. If plants can be obtained, so much the

better. They may be sown any time between April and August. Each particular variety should have a small bed, about 3 feet wide, to itself.

Fennel is propagated from seed or by division of the roots.

Marjoram.—Sow in light soil, and thin out, or in boxes. It grows and spreads rapidly.

Mint.—Propagated by division of the roots. Will grow in any fair garden soil, and spread rapidly, the roots running a long distance underground, and sending up shoots at every joint.

Parsley.—This most useful herb may be sown two or three times a year, but preferably in February or March and in August. Sow thinly, in drills 10 or 12 inches apart. When the plants are strong, cut them down, to induce strong, curled foliage. If not regularly cut, parsley plants will go to seed in one season.

Sage.—Like other shrubby herbs, sage may be grown from seed, by division of roots, and by cuttings.

Rosemary and *Thyme* are propagated in the same manner.

To Dry Herbs.—Gather on a dry day as the flowers are beginning to open. Carefully go over them, and remove dead leaves and any foreign matter. Tie in little bundles; hang in a dark, dry place, where a draught can get at them. When quite dry, rub off the leaves, sift, and clean out all dust and twigs. Then place the leaves in wide-mouthed bottles, and seal airtight. Do not on any account dry herbs by sun or fire heat. If they are treated as above, they will keep their flavour indefinitely.

FLOWER GARDEN.—Now is the time to plant out bulbs. A complete garden could be furnished with these charming plants, which are to be had in every colour and variety. Amongst the many are—amaryllis, anemone, arum, babiana, crinum, crocus, freesia, ranunculus, jonquils, iris, ixias, gladiolus, narcissus, jacobean lilies, tigridia, tritonia. All bulbs like well-drained, somewhat sandy soil, with a plentiful admixture of leaf-mould. Herbaceous plants and annuals which it is intended to raise from seed should be sown this month. Such are—antirrhinums (snap-dragon), asters, corn-flowers, dianthus, larkspurs, daisies, cosmos, candytuft, lupins, gaillardias, godetia, mignonette, poppies, pansies, phlox, sweet peas. Cannas now planted will require plenty of food in the shape of liquid manure. Put in cuttings of carnations. Chrysanthemums require attention in the way of disbudding, staking, watering with liquid manure, &c. Growers for exhibition will thin out to a few buds, and protect the flowers from rain and sun. Dahlias should be looking well. To secure fine blooms, disbudding should be done. Now, as to climbers which may now be planted. These are—Allamanda Schottii (beautiful yellow); Antigonon leptopus, a charming cerise-coloured climber; Aristolochia elegans, handsome as an orchid and easily grown; Aristolochia ornithocephala (Dutchman's pipe), very curious, large, always attracts attention; Asparagus plumosa, grown in any shady place; Beaumontia grandiflora, splendid white flower, grand for a fence, will grow 50 feet high; bignonias of several kinds; bougainvilleas, with their splendid leafy pink and purple flowers rapidly clothe a fence or unsightly shed with a blaze of blossom; Quisqualis indica, a fair creeper, flowers pink, changing to white; Wistaria, purple and white. Most beautiful is the Bauhinia scandens, rarely seen about Brisbane, not even in the Botanical Gardens. We grew a plant of this climber at Eton School, Nundah, and it soon closed in the front of the veranda for a distance of over 80 feet. The leaves are very small, and in the flowering season it presents almost a solid mass of beautiful round bunches of blossom, something like the hawthorn bloom—pink and white. It seeds freely, but the seeds are difficult to germinate, and when they have produced a plant, it is still more difficult to rear it. A rooted sucker from the main stem will in all probability grow.

Agriculture.

A VALUABLE POTATO.

In our last issue of this *Journal* we described the potato boom in England, and mentioned £500 as a high price for a single ton of the new Northern Star. It appears that, besides the Evergreen, Up-to-Date, Sir John Llewellyn, and Northern Star, there is another, of apparently great value, called the Eldorado. At the late Smithfield cattle show, a Mr. Findlay, of Markinch, who has reared the most notable varieties, had the misfortune to have one single Eldorado tuber stolen. That tuber was worth £70, which price had been offered for it, and was refused, only a short time before the theft. At our Queensland shows, we carefully guard our plates of strawberries, oranges, plums, and other fruit, which can be bought for a very small sum, by enclosing them in wire-netting. The moral for those who exhibit potatoes of such fabulous value is—enclose them in a glass case when exhibiting them.

The potato show at Smithfield was so extensive that people are asking whether, in future, the potato business is to supplant the live stock as the chiefest interest at Smithfield show. From all accounts, it is perfectly amazing to what extent the rush for new varieties at fabulous prices has developed. It is unfortunate that, under our Diseases in Plants Act, no potatoes may be imported from the old country. It might be found that some of the new varieties would find a congenial home in Queensland.

On this subject an English journal says:—Some extraordinary prices were realised at the Smithfield show recently for a few pounds of potatoes. Messrs. Isaac Pond and Sons, potato merchants, York, sold 4 lb. of Eldorado potatoes for £600, or at the rate of £150 per lb. This works out at £336,000 per ton, or about three times their weight in gold. Mr. Findlay, the raiser of these remarkable tubers, declined an offer of £70 for a single potato. A sum of £3,000 was paid for 10 tons of the Northern Star variety.

NOTE.—From a private letter from England we learn that a gentleman planted one tuber of Eldorado and realised £36 from the produce.—Ed. *Q.A.J.*

The Editor has just received a small parcel of Northern Star and Sir John Llewellyn. They will be planted under the most favourable conditions, but it is quite possible that, however well they may thrive in a cool, damp climate, they may not be found suitable for Queensland. The results will be published in the *Journal* in due course.—Ed. *Q.A.J.*

THE NEW VARIETIES OF POTATOES.

Discussing the enormous prices given for new varieties of the potato in England, and the heavy yields of some of them, the *Mark Lane Express* says:—

By necessity, the bulk of British potatoes grown in the next two or three years must be the failing Up-to-Date, whose splendid career must come to an end as soon as a change of stock can be made. There is no source from which the main fountain of the seed potatoes can be drawn, except from varieties even worse than the Up-to-Date. If a dry season comes the Up-to-Date will go through well; but by adhering to it, even in spite of a good crop in a favourable year, the breakdown will be only the greater in a wet year. It is the recognition of this that makes men of keen business perception make calculation as to what they can afford to pay for a share in a new variety of specially excellent promise. Though £150 may seem to be a truly marvellous price for 1 lb. of potatoes, yet since modern methods of increasing the yield have become generally known it is fully recognised that a hundred-fold increase may be relied upon. As in the case of the Eldorado the price a year hence will be £3 per lb., at least 100 per cent. profit will be made, and there.

are those who will double it. The history of the Northern Star is proof of this, and it is by following the possibilities of this that a sound calculation can be made. The Sir John Llewellyn is a further proof of the possibilities of a potato which attains popular favour. The Sir John Llewellyn has probably the most marvellous record of any ever put on the market. Put on the market at £20 per ton five years ago, it is worth more than that at the present time, and has been worth it every year. A simple calculation for five years on the ordinary basis of $\frac{1}{2}$ -ton of seed an acre and a yield of 7 tons at £20 per ton, even when £20 an acre is allowed for cultivation, shows an immense profit, and illustrates that the buyer of 1 lb. at that time would have made a big profit, because it would have produced in five years, at the above rate, 238 tons, worth £20 per ton, while by modern methods of reproduction the figures are almost appalling. But everyone does not go through with these things, as was illustrated last year by the fact that a farmer, having an army contract, fed the soldiers on Sir John Llewellyns when his Puritans ran short, and now regrets it!

The potatoes which have established themselves sufficiently to warrant farmers going on to them are the Royal Kidney, Sir John Llewellyn (as an early), Discovery, Northern Star, and Eldorado. In districts where it does not develop a dark mark through the centre or core-splitting, the Covergood is excellent, and a few others in minor degree.

GOOD POTATO MANURES.

As the result of some experiments conducted by the Glasgow and West of Scotland Agricultural College, it has been demonstrated that farmyard manure employed in large quantity, with the addition of mixed artificial manures, speaking broadly, does not generally give directly a profitable increase of the crop. If, say, 10 tons of farmyard manure are utilised, a combination of manures—like 4 cwt. of superphosphate (30 per cent. soluble), 1 cwt. sulphate of ammonia, 1½ cwt. sulphate of potash (95 per cent. purity)—gives not only a large increase over the heavy application of farmyard manure, but has proved eminently profitable. If the potash is deleted from the artificials, the results are very much poorer.

It has been found, also, that a combination of artificials, as follows:—6 cwt. superphosphate (30 per cent. soluble), 2 cwt. sulphate of ammonia, 1 cwt. nitrate of soda, 2 cwt. sulphate of potash (95 per cent. purity), is quite suitable for producing good crops of potatoes without the use of farmyard. It has been shown also by experiment that on many farms the amount of sulphate of potash in the last application might very profitably be increased to 3 cwt.

HARVESTING IN CANADA.

From a letter written by an agricultural student on tour in Canada to the *Scottish Farmer*, we make the following extract:—

All round, threshing is going on apace. The machine-owner, as I told you before, takes charge of the whole operation. He will either thresh straight from the stook, supplying men and teams for the "leading," or from the stack. In the former case 6 cents a bushel is the charge for threshing wheat, and about 5 for oats; in the latter, 5 and 4 cents respectively. It is a common day's work to thresh out 2,000 bushels of wheat. The straw is badly mangled and broken, but, being a waste product here, that does not matter. The machine is shifted at the end of each day to get clear of the accumulated straw, and the latter set on fire. It is quite a striking sight on a dark night to see these heaps blazing away far and near.

The threshing hands have a pretty stiff time of it. The engine whistle sounds a start at 6 o'clock in the morning, and, with as few stoppages as possible, the work goes on till 8 at night. The men get about 2 dollars a day and food, but have to sleep in the "caboose" or caravan, which allows but small space for the company—some thirteen or so of them.

As the land is being cleared, ploughing takes place, and as much as possible is turned over before frost sets in. A gang plough, with a seat for the operator, turning two furrows, drawn by four or five horses, is used.

HARVESTING ON SUNDAY: FROM AN HISTORICAL POINT OF VIEW.

The correspondence columns of the *Scottish Farmer* have, ever since the last disastrous harvest weather in the United Kingdom, been filled with letters dealing with the question of the right or wrong of harvesting on Sundays. With the controversy we have nothing to do, and offer no opinion on the subject. It may, however, be of interest to our readers to see what Mr. G. W. Murdoch has brought to light on the matter in the columns of the above journal. He writes:—

In the year 1546 Edward Seymour, Duke of Somerset, uncle of the young and pious King Edward VI. ("Lord Protector" of the realm), by orders of his king, took counsel with other great lords of Parliament, high church dignitaries, and others, and they deliberated long on the low moral and irreligious condition of the people. The outcome of these deliberations was a scheme of "injunctions" for the "reformation of religion," &c. That scheme consisted of thirty-six "injunctions"; they were approved of by the king, made law, and ordered to be widely circulated, read from the pulpit of every parish church, and they have never been repealed. I have here only to deal with injunction 24, which is as follows, as given in Fuller's "Church History of Britain from the Birth of Christ to 1648" (edition 1656. Book 7. Cent. 16):—

"That the Holy Day, at the beginning, Godly instituted and ordained, be wholly given to God, in hearing the Word of God read and taught in private and public prayers, in acknowledging their offences to God and amendment, in reconciling themselves to their neighbours, receiving the Communion, visiting the sick, &c., &c. Only, it shall be lawful for them in time of harvest to labour upon Holy Days (Sundays) and Festival Days, and save that thing which God hath sent; and that scrupulosity to abstain from working upon those days doth grievously offend God."

Mark the last fourteen words of this passage. It is true that that was an "injunction" addressed to the people of England, and not to the more Godly folk of my beloved country, but it is still a valuable injunction as showing the mind of the most amiable and pious Protestant monarch that ever reigned in England, to say nothing of the Lords of Parliament and whole "bench of bishops" in those Reformation times.

NEW WEED EXTERMINATOR.

In the warfare against weed and insect pests, *The Leader* is advised by the Washington Department of Agriculture, a new chapter is to be written which, before it is ended, promises to record an extended conquest. Experiments have been conducted by the United States Government on sections of the Potomac flats, which hitherto were a wilderness of rank weeds inhabited by millions of winged and burrowing insects. These lands are now producing crops of celery and other plants, in which not a weed grows, and which are unmolested by insects except as they fly in from neighbouring fields not subject to the expert treatment.

One of the soil and plant physiologists of the Department of Agriculture predicts that the time is near at hand when men with the necessary outfits will go about the country taking contracts, before planting time, to rid a farm entirely of weeds and insects, just as they now travel from place to place with threshing machines in the summer and autumn.

The present system of warfare is somewhat elaborate, but forthcoming experiments will include methods which can readily be adopted by farmers in general. A farm implement resembling a harrow in outward appearance may be used as part of the outfit. It is designed to have tubes of steel take the place of the harrow teeth. Pliable steam hose, similar to that in use in the air-brake system of railway trains, runs from a traction engine to connect with a central steam reservoir on the harrow, and thence radiating to the harrow tubes discharges into them boiling water and steam, under from 80 to 95 lb. pressure. Hitched behind the traction engine, this steam-surcharged harrow is hauled over a field about to be planted. The boiling water and steam thus injected into the soil kills every form of plant and insect life.

In the experiments conducted under federal auspices the results have been amazing, even to those who hoped the most from them. The hardy seed of the Russian thistle (*Salsola kali tragus*)—a weed which has spread to nearly every State in the union and become such a menace to agriculture that Legislatures and interstate congresses have convened to plan campaigns against it—is destroyed instantly by the new process. Even the perennial roots of such weeds as the horse nettle, or sand brier, cannot withstand this flood of steam.

In connection with the experiment an interesting discovery has been made by the Bureau of Chemistry—that the soil treated by the steam process is considerably enriched, the explanation being that the animal and vegetable life destroyed is converted into nitrogenous and other fertilising elements.—*Pastoralists' Review*.

[Has boiling water ever been tried on prickly pear? A Mr. Watson lately brought to this office some prickly pear roots, which were completely desiccated by some chemical which he applied hot to the plants. It would be interesting to know whether the destruction of the roots was due to the chemical used or to the boiling solution of chemical and water.—Ed. *Q.A.J.*]

AS OTHERS SEE US: A TRIP TO QUEENSLAND BY A WESTERN VICTORIAN.

The following notes on Queensland by a Victorian traveller appear in the *Pastoralists' Review*. They convey a perfectly truthful idea of the country passed through. Doubtless the writer expected to find Queensland still struggling out of the great drought, and he must have been extremely surprised to see a land flowing with milk and honey; fields of lucerne, maize, and other crops; vast stretches of rich pasture land densely covered with rich grasses and exhibiting not the slightest sign of having so lately been denuded of every green thing. Our passing visitor thus discourses on this happy land:—

Some financial authorities in Great Britain have been writing adversely to Australian interests on the subject of our national indebtedness. Had they travelled as I did from Sydney into Brisbane they would have moderated their views or totally changed them. At the border of New South Wales and Queensland we only see huge boulders of stones, almost a hill made of one stone, and we only see middling grazing country. Yet we know there is mineral wealth all about, though we see it not. When we approach Warwick then we see crops of lucerne and maize, which do one's eyes good. All round Warwick is an agricultural country of unbounded wealth, carrying crops of amazing quantity and quality. As you travel to Toowoomba you are lost in

amazement at the vast extent of this wonderful land. So far as the eye can reach—north, south, east, and west—are boundless plains of great fertility.

On those great plains, interspersed with timber and hills, you see land that would pay all Queensland's national debt twice three times over. So far as you can see on both sides of the railway there lies the unbounded incalculable wealth of Queensland. What financier could see that land and fear for the ultimate tremendous prosperity that, with population, Queensland shall attain. The crops of maize, of wheat, of lucerne, and of grass which that land now produces are wonderful. How much more wonderful it will be when the land is cultivated by ten times the people. A large proportion of the public indebtedness of the Australian colonies has been incurred for railways. I do not know if this railway now pays its way, and really it does not matter, for in the future it is bound to return immense dividends. The country is rich; the tonnage will become tremendous.

This immense extent of rich land requires to be brought into beneficial use by more subdivision and more farmers. At present where grass is grown it is mostly wasted. The grass is too long and strong for sheep, or even horses. It is cattle grass, or, as I heard lately, grass for elephants. This grass land requires to be turned into maize, wheat, or lucerne, each of which can be stored and kept for bad times, or turned into money in the best seasons. The fertility of this boundless expanse simply wants labour and water. With those two requisites the Warwick to Toowoomba Plains would pay all the national debts of all the Australian States. Let me add that the scenery is one of the finest man can experience—mountains, hills, forests, plains in one succession of rich and varied beauty. For extent of rich fertile land I should think this is unequalled in Australia. In a good season such as this the land is the land of Goshen, but much better, more extensive, more valuable.

From Toowoomba we descend some 1,400 feet of purely grazing country, then we drop on to more maize, more lucerne, more rich land, through which we reach Ipswich. From this to Brisbane I note nothing of moment. I am privileged to go down the river on a nice clean steamer. This river I remembered as being dangerous or rather troublesome. Our steamers went aground in days of long ago. This time the river seems wide, and we saw no trouble, and we went into Moreton Bay, and we were taken to a prison on an island called St. Helena. This island possesses a wonderful formation. It is volcanic, and is as pretty a place as one could wish to see. The land is rich and fertile. We saw the finest maize and the best lucerne we have yet seen; maize 9 feet 6 inches in height must have good land to produce it. Prisoners sent here ought to be happy. Indeed, one felt that if breaking the laws of Queensland would place you in this love of a place it would be wise to break the law. I had an opportunity to see the prisoners and their management, but I was so pleased with the manager's garden and house that I omitted seeing murderers. We left this lovely fertile island with much regret, but soon we were away and steaming up the beautiful river to Brisbane. Some day I may give you my views of the great western pastoral country. For the present, I conclude with again expressing admiration of Queensland in its immense resources of the best quality of agricultural land, as evidenced in the Darling Downs.

GOOD ROADS.

Whilst much good agricultural land and land suitable for fruit-growing and market gardening is found in this State, in districts where the nature of the country permits of the making of excellent roads at small cost, as, for instance, at Nundah and Nudgee, Oxley, the neighbourhood of Ipswich, and many other favoured districts of East and West Moreton, as well as in some districts such as Warwick, on the Darling Downs, by far the greatest portions of the finest agricultural lands in the hill districts are almost inaccessible

owing to the want of roads on which reasonable loads can be carried by horse or automobile power. The cost of ordinary road-making may be set down at about £800 or £900 per mile. A hill road in mountainous country would cost considerably more. Then there is the constant maintenance, for if a road is not kept in repair, especially when it is constantly cut up by the wheels of timber-wagons, it might as well not be made, for a bush road cut up into deep ruts and washed out by heavy rains is more useless and more dangerous than the ordinary bush tracks which may be avoided by constant detours. On a main road, the traveller is confined to the space between the watertables and the fences, and cannot avoid ruts, holes, boulders, and bogs. So long as the wheels of heavy wagons remain unchanged as to their narrow tires, so long will the cutting up of the roads continue, and the expenditure on repairs continue to be a serious burden on the taxpayer. For, be it remembered, neither main road nor any other roads branching from it bring in any revenue. Not only has interest to be paid on the initial cost of construction, but also that on the expenditure for repairs, both to the road and to the bridges and culverts. There is no revenue to be derived from these, except by means of that relic of the dark ages—the toll-bar. The infliction of toll-bars would be justly resented by the travelling public.

Much wear and tear of roads would be avoided if all vehicles carrying heavy loads such as timber, wool, minerals, &c., were compelled to adopt a broad tire. In some parts of the State the broad tire has been adopted with much benefit.

At the Agricultural Conference in Maryborough in July, 1903, the Hon. A. J. Thynne, M.L.C., read a most interesting paper on "Queensland Country Roads." During the discussion which followed, Mr. Atkinson, of Danderoo, said:—

"The question of road-making and good roads is a very big one, and the difficulty our shire councils have to encounter is the fact that they have so many roads to attend to. Our shire council is in a pretty wealthy district, and has been very sympathetic to the farmer. . . . As for road-making generally, there is no doubt that a lot of money is wasted for want of a little more. Farmers would help themselves if they adopted the broad tire. I am by trade a wheelwright and coachbuilder, and can say that the general introduction of broad tires will do as much as anything to solve the bad road difficulty. The broad tire is the very best that you can put on farm lands, and when I started farming the first thing I did was to build a dray with 4-inch tires. I wanted 5-inch, but there was a difficulty in getting them. It is the lightest dray in my part of the district, yet I can guarantee to take on it a bigger load to the railway with one horse than any other man on the countryside. The local authorities could do much to encourage the use of broad tires. If there were a tax put on all new 3-inch tires, we should soon get wider ones. When the wheelwright firm I was in first went to Hughenden, we found the 3-inch tire was the standard, and we said to the woolmen: 'Go in for wider tires.' When we left there we had instituted the 6-inch tire—the greatest road-maker ever introduced onto the blacksoil plains."

A wheel tax is also imposed in some districts, but still the problem of cheap, useful roads, in constant good repair, has not been solved. When a railway passes through a country district, the main road is at once neglected, it being supposed that people will naturally employ the railway for the carriage of heavy goods. And doubtless this is largely the case; but railway stations and good sidings are not built at every man's sliprail, nor will a train pull up anywhere and everywhere for the public convenience or inconvenience. Therefore, the main road is still required to enable people living at a distance from a railway station to carry their goods to and from it.

The remedy for this state of affairs lies in the substitution of light railways or tramways for metalled or unmetalled roads. The cost of a tramline, on the narrow 2-foot gauge system, even in hilly country, does not amount

to more than from £800 to £1,000 per mile, about the same as the cost of an ordinary road. But the tramline service is productive of revenue. Wherever tramlines have been built they have usually paid their way, or, if they have not done that, they have gone so near it that the deficiency bears no proportion to the annual outlay on the highroads. The cost of maintenance is also much less, once the line has been faithfully built. On level country trams may take the place of trains, travelling, certainly, at less speed, but, nevertheless, conveying goods and passengers in certainty and at regular times to their destinations. The running of a train of tramcars capable of carrying from 20 to 30 tons would necessitate the employment of but two men, as in the case of street cars. If those 30 tons had to be carried by wagons drawn by horses over bad roads they would employ 30 horses and 15 drivers. In heavy weather and on boggy roads the team could often not travel at all, but the tram train would not be hampered with such considerations, except at such times as when heavy floods occur; and even then the tram has the advantage, as, even before the water has completely left the track of a line in flooded country, the cars could run, whereas the wagons would have to remain until the sodden roads became hard enough to bear their weight.

Mr. Thynne, in concluding his paper, gave a table of gradients between 1 foot in 10 and 1 foot in 30, showing how much the hauling power of a horse is affected by the grade of a road as compared with his hauling power on a level road of the same quality, which is taken as represented by the unit 1:—

TABLE OF GRADIENTS.

Inclination.					Angle.	Rise in Feet per Mile.	A Horse can Draw—
1 in 10	...	...	...	...	5°43'	528	0·25
1 in 11	...	...	...	...	5°11'	480	0·265
1 in 12	...	...	...	...	4°46'	440	0·28
1 in 13	...	...	...	...	4°24'	406	0·295
1 in 14	...	...	...	...	4°5'	337	0·31
1 in 15	...	...	...	...	3°49'	352	0·325
1 in 16	...	...	...	...	3°35'	330	0·34
1 in 17	...	...	...	...	3°22'	310	0·355
1 in 18	...	...	...	...	3°11'	293	0·37
1 in 19	...	...	...	...	3°0'	277	0·385
1 in 20	...	...	...	...	2°52'	264	0·4
1 in 24	...	...	...	...	2°23'	220	0·5
1 in 25	...	...	...	...	2°18'	211	0·52
1 in 26	...	...	...	...	2°15'	203	0·54
1 in 30	...	...	...	...	1°55'	176	0·64

Thus it appears that, if on a level road a horse can draw 1 ton, he can only draw 5 cwt. up an incline of 1 in 10, or about 12 cwt. up an incline of 1 in 30. He could only draw about 6 cwt. up an incline of 1 in 17. The little motor on the Nambour tramline can take 5 tons up an incline of 1 in 17.

CO-OPERATION IN ITALY.

The *Bulletin Mensuel de l'Office de Renseignements Agricoles*, Paris, takes the following article from the *Deutsche Reichs Anzeiger*:—

The vigneroni of Tuscany cultivate fruit trees, vegetables, cereals, and hood plants between their vine trellises. The sale of fruits, certain vegetables, and potatoes represents their principal source of income. A few years ago these producers complained of the want of outlets for their produce, and of exorbitant charges of the middlemen. Mr. Gari Montanelli, Professor of Agriculture at Florence, with the object of creating new outside markets, and doing away with many middlemen, undertook the formation of peasant co-operative societies for the direct sale in common of fruits and vegetables. These societies

have a uniform organisation, and work in concert with a large business firm, which represents them, and, besides that, contracts:—1, to establish and maintain, at its own expense, a shop or warehouse at the centre of operations of each co-operative society; 2, to supply packing materials, and, if necessary, means of transport; 3, to pay a specialist employed to superintend consignments; 4, to advance the cost of transport, and to furnish a guarantee for at least 10,000 liras (about £416), from which fund the co-operative society may make advances to its members according to the value of the produce delivered.

Every member of a co-operative society, who wishes to make a consignment, must notify the local transport warehouse at least three days beforehand, in order that means of transport may be placed at his disposal in time. The grading and packing are carried out at the local warehouse by employees of the business house mentioned, under the superintendence of a representative of the co-operative society. By arrangements made between the business firm and the society, the members desirous of disposing of particularly scarce or especially excellent goods may make deliveries on their own account, but of not less than 25 kilogrammes (55 lb.) as a minimum for each transaction. With regard to grading and packing, the co-operative society of producers of the Ripoli Plain has entered into an agreement with an importing firm at Berlin at the following fixed prices:—7 liras (5s. 10d.) for 50 kilogrammes (110 lb.) of fruit, and 2 liras (1s. 8d.) for 50 kilogrammes (110 lb.) of potatoes. A woman can in one day grade and pack 150 kilogrammes (330 lb.) of pears, or 100 kilogrammes (220 lb.) of apples, or 60 kilogrammes (132 lb.) of cherries, or 50 kilogrammes (110 lb.) of peaches.

The grading and packing are so rapidly done that produce delivered before noon is sent away on the same day. At Berlin the sales take place by auction under the superintendence of a commissioner of the city. The results of the auction sales being published in an official organ, the Italian co-operative societies are able to control the prices given by the firm representing them. Account sales are furnished in detail every week, showing the amounts realised and the deductions made for freight and commission; the balance is remitted to the co-operative society, which distributes the amount amongst its members. Protests are decided by an arbitration tribunal.

The new societies have obtained excellent returns for their members.

SEWAGE FARMS.

We are in receipt of the Annual Report on the Working of the Sewage Farm at Mánjiri, by the Deputy Director of Agriculture, with a note by the Agricultural Chemist to the Government of India, Dr. J. Walter Leather, Ph.D., F.I.C., &c. As it is within the bounds of probability that some day steps will be taken to utilise the sewage of Brisbane in some better fashion than conveying it to Moreton Bay and dumping it into the sea, we propose to give our readers a *résumé* of what is being done in India in this direction. With our oldest arable lands in the neighbourhood of the metropolis rapidly wearing out, we not only do not make use of a most valuable manure—the city refuse—but we actually export manure for want of which our sugar lands are languishing. We export manure—bonedust and sulphate of ammonia—to the value of over £16,000 annually, instead of utilising it on our lands. Steamer-loads of nightsoil are daily taken out to be deposited in the sea, and millions of gallons of sewage water, heavily charged with valuable fertilisers, are daily running away into the river. The sewage farm at Mánjiri is divided into 20 plots, which are irrigated with the effluent from the septic tanks. About 3,500 gallons per day per acre are supplied in from 30 to 40 waterings during the year. This supply is stopped in the case of sugar-cane about two or three months prior to cutting for the mill.

During the process of purification, the crude sewage is passed through septic tanks and contact beds. The septic tank effects the dissolution of the solid organic matter of the sewage, and the contact beds cause a further purification by the oxidation of the lower salts.

In English towns where the sewage finds its way into rivers, contact beds are now insisted on for sanitary purposes.

We are, however, concerned only with the agricultural value of the sewage. The work done by artificially prepared filters or contact beds is equally well performed by the soil. Is it, therefore, necessary to go to the expense of constructing contact beds? The subjoined statement shows the out-turn of crops irrigated with the effluent and the filtrate:—

No.	Crops.	Irrigated with Effluent, Yield per Acre.	Irrigated with Filtrate, Yield per Acre.
		Lb.	Lb.
1	Onions	31,607	27,845
2	Ground Nuts	3,647	2,860
3	Turmeric and yams	46,412	54,322
4	Suran*	24,900	20,309

It will be observed that, on the whole, the balance lies in favour of the septic tank effluent, and the field results are borne out by chemical analysis. Each plot is 16 gunthas (0.4 acre).

The report then goes on to describe the analytical methods employed. The *average* results of analyses are thus shown:—

PARTS PER 100,000.								
			Ammonia Nitrogen.	Organic Nitrogen.	Nitric Nitrogen.	Total Nitrogen.	Nitrogen remain- ing at different stages.	Oxygen absorbed in four hours.
DECEMBER—								
Crude Sewage			2.36	1.99	...	4.35	100	4.13
Septic Tank No. 8			3.05	1.17	...	4.22	97	4.45
" No. 12			3.00	1.07	...	4.07	93	3.84
Contact Bed No. 1			1.58	.60	.12	2.30	53	1.7
" No. 2			1.58	.84	.46	2.87	66	2.0
MARCH 16-30—								
Crude Sewage			2.60	6.93	...	9.53	100	13.1
Septic Tank No. 6			3.60	5.05	...	8.65	91	11.1
" No. 8			3.96	3.95	...	7.91	83	9.9
" No. 12			4.58	2.86	...	7.44	78	8.6
Contact Bed No. 1			2.84	2.89	.15	5.88	62	7.0
" No. 2					Bed out	of use.		

The intervening months for January and February are given in the report, but these we omit, as the records for December and March show the extremes.

In a previous paragraph it was shown that for sewage containing about 2 parts of organic nitrogen per 100,000, no further change took place in it after about sixteen hours. Mr. Leather then goes on to say:—

"The stronger sewage contained more than three times as much organic nitrogen compounds; would it therefore require three times as long—namely, about forty-eight hours—for its complete decomposition? As the figures show, the rate of hydrolysis was much greater than with the weaker sewage, about 2 parts disappeared during the first twelve hours, another 1 part during the

* A kind of yam which has to be planted for three or four years in succession till it attains a marketable size. The gross value of the yield is 500 rupees per acre. Reckoning the rupee at 1s. 6d., this is equal to £37 10s. of English money.—Ed. Q.A.J.

following four hours, and rather more than 1 part during the last eight hours of flow through the tank. Thus, whilst with the weaker sewage only about 1 part of the organic nitrogen was disposed of during sixteen hours, 3 parts were changed to simpler forms in the stronger sewage during the same time. The rate of change, both actually and relatively, was thus much greater. The sewage left the tank at the end of twenty-four hours before there was evidence of the cessation of hydrolytic changes, and in future experiments provision should be made for a longer septic tank for this stronger sewage, so that it may remain in it for thirty-six hours at any rate, if required. On the assumption of the rate of change remaining constant, the organic nitrogen in the sewage would have fallen to about 1 part in thirty-two or thirty-six hours; but I should expect the changes to cease before that point was reached. In any case it is certain that this stronger sewage would require a septic tank only about twice the size of that for the weaker sewage, although it contained fully three times the amount of complex nitrogenous matters.

I have left unnoticed the result of the permanganate test (oxygen absorbed in four hours). It is an empirical test of a very indefinite character, and, although useful in some cases, has not the pretensions to accuracy which the determination of organic nitrogen has. The hydrolytic changes occurring in the septic tank may, and commonly do, occasion the production of compounds which destroy permanganate, and if these are usually in less quantity than the compounds from which they are derived, the fact makes the test of a very doubtful value, so far as the septic tank is concerned. Thus, during December, the quantity of oxygen absorbed by the crude sewage was 4.1 parts, after sixteen hours in the tank the figure rose to 4.4 and then fell to 3.8 after another eight hours; during January, the figure for the crude sewage was 5.1, it fell to 3.0 after sixteen hours and 2.7 after another eight hours; during February, the figure for the crude sewage was 4.6 which fell to 3.3 after twelve hours, to 2.9 after sixteen hours, and to 2.4 at the end of 24 hours' flow. While the test thus showed that the sewage became less and less oxidisable as it flowed through the tank, its indications are not characterised by that definiteness which marks the organic nitrogen.

The Bacteria Beds.—One half the effluent has been flowed into "contact" or "bacteria beds," about 3 feet deep, filled with very coarse broken "burnt ballast." One of the beds, No. 1, received two charges of sewage per day until 1st February, after which certain alterations were made in its use; the other bed, No. 2, received daily only one charge of septic tank liquid. The beds were allowed to remain full of sewage for two hours, and No. 1 was always allowed to remain empty for at least two hours, before being filled again.

Both beds purified the weak sewage quite well, nitrates were always present, and no secondary decomposition occurred in bottles kept for one week. Moreover, their sewage capacity did not decrease during the year, as has so often been the case in the English experiments. At the same time the amount of nitrates was not so great as has frequently been found elsewhere. For instance, the nitric nitrogen in the effluent from the three-year-old beds at Mánjri has varied from 1.3 to 2.0 parts as against the .1 or .2 parts in the effluent from these new beds. No. 1 Bed purified its two charges as well as No. 2 purified its single charge; and the reduction in the amount of organic nitrogen and in the oxidisability was quite as great. These beds may or may not prove a necessity in India. One of the questions which it is desired to solve is whether effluent from the septic tank may be run on to the land constantly, without detriment either to it or the crops. If this prove to be the case, the necessity of the secondary treatment by contact beds or continuous filters will not arise in those cases where the sewage is used agriculturally.

But it will take some years of experiments to settle this point, and in the meantime it behoves those who have the opportunity to test the effectiveness of the contact bed. In case this should prove to be a necessary adjunct to the system of purifying tanks, it is desirable to know, as in the case of septic tank,

what is the smallest contact bed area necessary for a certain flow of sewage. It becomes, therefore, a question of how many times these beds may be filled in the twenty-four hours. The more frequently they may be filled, the smaller will be the total area required. With this in view, No. 1 Bed was put to a severer test during February than previously.

Up to this time, it required one hour to fill, two hours to rest full, one hour to empty, and at least two hours to aerate a bed. These are the periods nominally supposed to be adopted at Exeter. But as all the work had to be completed in the daytime at Mánjri, it became necessary, if the capacity of a bed for dealing with more than two charges per day was to be tested, to reduce the foregoing periods somewhere. Neither the time for filling nor emptying could be reduced, and, as the aeration of these beds is known to be of great importance, I recommended that the period allowed for resting full should be reduced. As the sewage takes about one hour to run in and another hour to run out, it is clear that, if the emptying be commenced as soon as the bed is full, the sewage is, *on the average*, in contact with the material of the bed for one hour. Some of the sewage will be in contact for a shorter time, some for a longer time, but most of it may be said to be in contact for about one hour. Accordingly, from 1st February to 8th, Bed No. 1 received two charges of septic tank liquid per day, and in each case the emptying commenced as soon as the filling was complete. The quality of the effluent remained as good as before, the quantity of nitric nitrogen being, indeed, greater during that period than previously; the amounts were .48, .47, and .37; and there is no reason for suggesting that this was in any sense a useless experiment. I would have preferred to continue it for a month rather than one week, but as the strength of the sewage was to be increased shortly, I wished to test whether this bed could deal with three charges per day, while the strength of the sewage remained what it had been. Having found no objection to commencing the emptying as soon as the bed was full, No. 1 Bed was subjected to the following treatment:—6 to 7 a.m. filling, 7 to 8 a.m. emptying, 8 to 10 a.m. resting empty, and then filled and emptied twice more during the twelve hours under like conditions. The purification remained perfectly good while the sewage remained of the weaker description. Whether one would try to carry out this in dealing with a city sewage is a different matter. If contact beds had to be employed, arrangements would *have* to be made for filling them during the night as well as during the day, and if each purified four charges per twenty-four hours it might be considered satisfactory. But no other means than the above were available for testing whether one of the beds would purify more than two charges per day. The effluent from the *third* charge was always analysed, as it might be presumed that this would be the worst, and, consequently, most likely to demonstrate any defects in the purification. I consider the experiment has shown that, with sewage of the strength then running, these contact beds might be expected to purify certainly three and probably four charges per twenty-four hours.

In March, with the much stronger sewage, the bed became rapidly foul.

Another matter which is of importance agriculturally is the loss of nitrogen from the sewage during these several purifying processes. By the term "loss" is meant not such changes as from complex nitrogenous matters to ammonia, or from the latter to nitric acid, but the disappearance of the nitrogen from the sewage, probably in the form of the gaseous element.

The Sanitary Engineer may be very well satisfied to see this element disappear from the sewage into the air, but to the agriculturist such a view of the question is entirely unsatisfactory.

Some portion of the nitrogen originally in the sewage is always lost during the progress of the changes occurring in the septic tank and beds, and it is of considerable interest to note what the loss has been. It is shown in column 6 of the statement of average results.

The total nitrogen of the crude sewage is taken as 100 and the figures following show the relative amounts of total nitrogen remaining at the different

stages of the process. Thus, in December, out of 100 parts of combined nitrogen in crude sewage 97 remained (that is, 3 were lost) during the first sixteen hours in the septic tank, and at the end of another eight hours 4 parts more had disappeared. During January the losses were greater, 10 per cent. of nitrogen disappeared during the first sixteen hours, and 4 per cent. more during the following eight hours. February figures were higher still, 14 per cent. disappeared in the first twelve hours, another 5 per cent. in the following four hours, and 3 per cent. more in the last eight hours. Thus, of the nitrogen in the crude sewage of the weaker kind, the losses due to the septic tank treatment came to 7 per cent. in December, 14 per cent. in January, and 22 per cent. during February. With the much stronger sewage of March the losses during the half-month came to 22 per cent.

Then, again, similar losses take place as the sewage passes through the contact beds. In December, out of the 93 parts nitrogen in the septic tank effluent, only 53 remained when the sewage left Bed No. 1, and 66 when it left Bed No. 2, the losses thus amounting to 40 parts and 27 parts respectively.

During January the loss occasioned by No. 1 Bed was 24 parts, and by No. 2 Bed 15 parts. In February the corresponding figure for No. 1 Bed was only 5 (Bed No. 2 was not used that month). Finally, with the strong sewage of March, the loss caused by Bed No. 1 was 16 parts.

The nature of the biological processes involved are so little understood that no attempt can be made at present to prevent these losses. They vary very much indeed. From $\frac{1}{4}$ to $\frac{1}{3}$ of this valuable element has been lost in the Mánjri experiments.

The following statement shows the average amounts of phosphoric acid and potash per 100,000 of sewage as it left the septic tank—to which the amount of nitrogen is added for convenience of reference:—

		Nitrogen.		Phosphoric Acid.		Potash.
December	...	4.07	...	1.92	...	1.47
January	...	3.42	...	1.72	...	1.37

If the irrigation rate be assumed as 4,000 gallons per acre per day, this sewage would supply 1.5 lb. nitrogen, .73 lb. phosphoric acid, and .57 lb. potash.

From these figures and the known requirements of some of the crops grown at Mánjri may be calculated the plant food supplied, and that probably taken from the land. The following statement exhibits this:—

Crop Grown.	Weight of Crop.	ESTIMATED REQUIREMENT, LB. PER ACRE.			ESTIMATED TO HAVE BEEN PROVIDED BY SEWAGE, LB. PER ACRE.		
		Nitrogen.	Phosphoric Acid.	Potash.	Nitrogen.	Phosphoric Acid.	Potash.
	Lb.						
Pandia sugar-cane	67,454	82	51	226	772	371	288
Sannabile "	101,331	124	77	344	735	353	274
Surans	22,604	45	22	90	161	77	60
Jowár fodder	12,635	29	11	29	67	32	25
Maize "	9,884	39	15	32	176	84	66
Onions	29,726	59	30	118	416	200	155

It will be clear, therefore, that the weaker sewage, which was used during the first year, was amply strong enough to manure the crops as well as to water them.

In his letter No. 181, dated 30th April, 1903, to the Director of Land Records and Agriculture, Bombay, the Sanitary Engineer enters at considerable length into the question of the probable strength of the sewage with which the Mánjri experiments have been made during the first twelve months, and he draws the conclusion that it has corresponded to probably 40 to 50 gallons per head per day instead of the 20 gallons which was intended.

Personally I have found it impossible to rely on any of the methods of calculation which one might wish to adopt. For instance, Mr. Pottinger considered that only about three-fifths of the urine would go into the sewers. Presumably this fraction was a mere guess, but, supposing it were true, then, since the whole of the chlorine and about nine-tenths of the nitrogen are voided in the urine, one could only expect three-fifths of the chlorine and much the same proportion of the voided nitrogen to be present in the sewage. Mr. Herbert has left this out of his calculation in paragraph 4 (b), 4 (c). If these deductions are made, it could be shown that the Mánjri sewage has been equivalent to about 30 gallons water per head, and much the same result may be arrived at if one takes figures deduced by Lawes and Gilbert or by Wolff. In fact, if one is to calculate what the strength of Indian sewage will be by either the proportion of chlorine or total nitrogen, one must assume that the whole of the urine passes into the sewers. If on the other hand one admits with Mr. Pottinger that only a part of the liquid excrements will pass into the sewers, then the strength of the sewage as gauged by the proportions of chlorine or nitrogen will of necessity appear weak.

In addition it has to be recollected that, supposing the amount of urine used has been too small, the quantity of solids added has not been too small, and so far as we know the rate of purification of sewage depends relatively more on the amounts of these than on the quantity of urea.

But other considerations must be kept in view. One is mentioned by Mr. Herbert at the end of paragraph 5 of his letter—namely, that “it is also usual in Indian towns to add a large quantity of nightsoil from the unsewered areas to the sewage.” It is needless to say that this would alter the composition of the sewage materially. It would not increase the chlorine content, but would increase the amount of organic nitrogen; and it is also more than likely that the rate of hydrolysis of these effete matters in a septic tank would be slower than if the added matter had been principally urine.

I consider it impossible to predict the strength of Indian sewage. It may quite probably prove to be stronger than has been anticipated. It must materially depend on the liberality of the water-supply, but it seems to me to be certain that it will vary from place to place within considerable limits.

It was indeed for this reason that I recommended in February, 1902, that sewage of different strengths should be experimented with, so that, whenever tanks and beds were to be built for any town, one could turn to these experiments for information as to the size of the tanks and the area of land required.

Mr. Herbert sets forth in paragraphs 11 to 14 of his letter reasons why the Mánjri experiments should be utilised to indicate the smallest area of land on which strong sewage, purified by bacteria beds in addition to the septic tank, may be applied to land “regardless of injury to crops” (paragraph 14). I consider that sewage in India should not be placed on the same footing as in England, where its agricultural value is left out of account.

At Mánjri we have quite a limited area and a limited quantity of sewage to experiment with, and it is most desirable that these experiments should be limited to one or two principal issues, so that what results are obtained may be of a reliable nature. It was for this reason that objection was taken to halving the area of the present plots in order to try the effect of weak and strong sewage purified (a) by the septic tank only, and (b) by the bacteria beds in addition to the septic tank. This proposal would have necessitated one of two things. Either the number of plots would have had to be doubled, and the size of each reduced to such an extent that the experimental error (ever present in such field experiments) would probably have been unduly magnifying. The difficulty of applying even approximately the proper amount of sewage would also be great. Or, secondly, the number of crops grown would have had to be reduced, so as to provide larger plots for the four descriptions of sewage. The practical value of the experiment, from the agricultural point

of view, would then have been seriously diminished. It was therefore decided to adhere to the present number of crops and to two kinds of sewage, and I think the decision was a very wise one.

YIELD AND COST OF CULTIVATION.

When we come to examine the yield per acre of the crops mentioned, grown on the sewage farm, we find that the returns are fair, but no more than are yielded by the ordinary crops grown in this State. The following table will show this:—

Crop.	Yield per Acre.	Value.	Cost of Cultivation.	Net Return.
	Tons cwt.	£ s. d.	£ s. d.	£ s. d.
Onions	13 17	14 18 6	11 17 0	3 1 6
Ground Nuts	1 12	10 8 6	8 5 0	2 3 6
Turmeric	2 16	19 7 0	16 19 0	2 8 0
Yams (nearly)	18 0			
Surans	11 0	41 9 6	23 5 0	18 4 6
Sugar-cane	47 0	34 0 0	23 0 6	10 19 6

It should, however, be noted that the cultivation charges include the purchase of a small sugar-mill, of bullocks, also the construction of sheds for bullocks and drivers, with other incidental charges, such as the superintendent's pay, none of which can properly be included in the actual cost of planting, cultivation, and harvesting.

AGRICULTURE IN STATE SCHOOLS.

We have been favoured by Mr. W. A. Healey, head teacher of the Highfields State School, which is situated on the Main Range, $1\frac{1}{4}$ miles from Spring Bluff, with the following results of the practical teaching of agriculture on State School land. We heartily congratulate Mr. Healey on the success which has attended his effort to give some practical instruction to his pupils, which cannot fail to prove of great value to many of them and eventually to the State, even if only one or two of them follow up the science of wheat-growing and of hybridising in after-life:—

NOTES ON EXPERIMENTS IN WHEAT CULTURE CARRIED OUT BY SENIOR BOYS AT HIGHFIELDS STATE SCHOOL, IN CONNECTION WITH THEIR AGRICULTURE LESSONS.

This practical work was suggested by the District Inspector's Report for 1902. Permission was given by the Minister to enclose part of the school reserve, and aid was granted towards fencing. The Department of Agriculture also forwarded samples of wheat and *Paspalum* roots. Other seeds were obtained from local farmers and the Dominion Milling Company. The chief aim was to show to the boys by actual experiment the truth of the principles enunciated in the text-book (Tanner's First Principles of Agriculture), and in Dr. Cobb's pamphlet on seed wheat (kindly lent by Inspector Shirley). That the advantages of large plump seed are:—

1. It is likely to be a healthy seed, and, therefore, more likely to produce healthy plants.
2. There is a larger percentage of growth and fewer failures.
3. The plants from such seeds are larger and thriftier and more resistant to disease, drought, and starvation.

We were unable to follow Dr. Cobb's system of grading in carrying out our experiments, but were obliged to be content with one less elaborate.

The largest and plumpest seeds we classed No. 1.

The medium seeds No 2.

The poor seeds (shrivelled, but not "tailings") No. 3.

The following is a table of results. Sixteen grains of each grade were planted:—

Name of Variety.	Where Obtained.	Date of Planting.	Number of Plants which Grew.			When Reaped.	Weight in Grains and Straw—Lb.			Rainfall.	Pests.	First Appearance of Rust.	Treatment before Planting.
			May.	1.	2.		3.	1.	2.					3.
Budd's Early ...	Local ...	21	9	9	6	3 Dec.	6	2½	1¾	— Total Rainfall—May 21 to December 31— about 21 inches.	Small birds pulling up young shoots, aphides, rust, snout, white top, caterpillars.	11	None.
Allora Spring ...	Ditto ...	21	13	15	13	19 Nov.	1¾	1½	1¾			11	ditto
Smart's Early ...	Department of Agriculture	21	15	14	12	19 "	2½	1½	0¾		10	ditto	
Marshall's No. 3	Local ...	22	7	11	6	30 "	1¾	1¾	1¾		11	Salt and water.	
Dart's Imperial	Department of Agriculture	22	13	16	12	19 "	1½	1½	1½		11	None.	
Belatourka	Mr. Walsh, Toowoomba, Storekeeper	22	15	15	14	28 "	2½	1¾	1¾		11	ditto	
W. Talavera		22	16	15	11	3 Dec.	3	2	2		11	ditto	
Baltic Red		22	8	11	12	13 "	7	4¾	4		11	ditto	
Petatz Surprise	Department of Agriculture	27	10	11	10	30 Nov.	1¾	0¾	0¾		5	Bluestone (quarter hour).	
Baroota Wonder	Ditto ...	27	11	8	7	3 Dec.	2½	1½	2½		5	ditto	
Newman's Early	Ditto ...	27	8	8	10	30 Nov.	1	1	1		11	ditto	
Gluyas ...	Ditto ...	27	13	12	10	3 Dec.	3½	1½	2½		11	ditto	
Russo Barletto	Dominion	30	14	13	16	13 "	5	3½	3		11	ditto	
	Milking Co.												
Hard Manitoba	Ditto ...	30	13	12	12	13 "	7½	5	4¾		11	ditto	

A link of space was allowed between each two seeds, and a link between two rows. Two feet of space was allowed between the varieties.

The original intention was to weigh grain and straw separately, but chiefly on account of the difficulty in winnowing we found this impracticable.

Besides the foregoing, we had four plots of wheat, each about 12 square yards in area. The varieties grown in these plots were Allora Spring, Dark Imperial, Hard Manitoba, and Russo Barletto. Of these the Allora Spring and Hard Manitoba were by far the best. The Manitoba variety was very late in ripening, but it was nearly free from rust, and the grain was hard and plump. The Allora Spring was a very level crop, and nearly free from rust. It was ripe about 25th November. The other two varieties were very rusty.

Our soil is a loose, red, clayey loam. It was broken up a year previous to the wheat being sown. No crop had been taken off it before. It was thoroughly dug with a fork and well raked.

We have now seven varieties of maize growing. Of these the best looking at present is the Mottled Corn, locally known as "German Coon."

This year we shall try to obtain small quantities of manures and fertilisers for the purpose of illustrating Chapters IV., V., and VI. of our text-book. If we are too late for the second maize crop, we may prepare our land for wheat, or, perhaps, experiment with potatoes.

The weather last wheat season was too wet. Situated as we are, about 2,100 feet above sea-level, and on the ridge of the Dividing Range, we receive the full force of the rain storms. These, last year, were of frequent occurrence.

FOOD GOVERNS GROWTH.

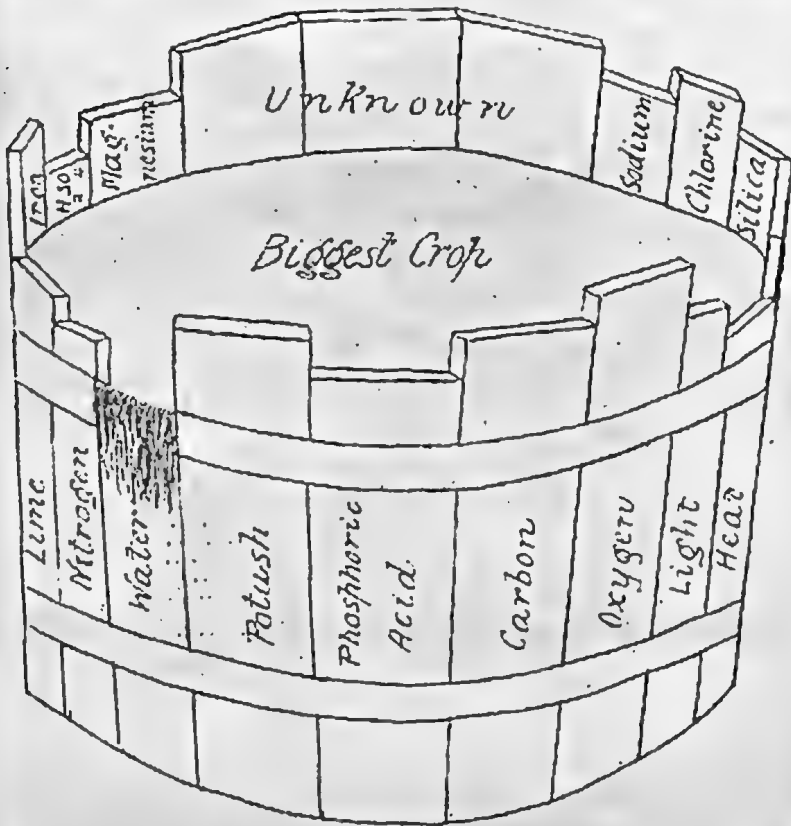
MAXIMUM CROPS AND MINIMUM PLANT FOOD.

The accompanying illustration, which, with the application of "Liebig's Law of the Minimum," we take from the *Garden and Field*, affords a striking illustration of the law that the crop which a given soil will produce depends on the smallest supply of any necessary plant food or condition of growth.

All know that if we have a tub with staves of various heights, as here depicted, the quantity of water which the tub will hold is measured by the height of the lowest stave.

Thus, in the illustration there is shown to be a full supply of all forms of plant food associated with ample light and heat, but the water supply is short, and is the measure of the crop which the tub of soil will produce. The illustration finds practical application in all our dry country, and needs no comment. Last season the drought struck all northern and western Victoria, and much of northern South Australia. The result was a partial up to a total failure. Where, however, the water was given, as, for example, in the Goulburn Valley irrigation area, the crops were good. This season, with a good rainfall, the crops on the same land are wonderfully good.

The deduction is that rich land is no good without water.



Plant Food and Crops. Liebig's Diagram.

The same applies to cultivation. We may have rich land and abundance of water, but under such conditions the minimum crop will be decided by the character of the cultivation. Any farmer or gardener will be able to supply illustrations.

Again, we know that the great development of phosphatic manuring is merely a striking example of the application of the law. It is well known that thousands of acres of the best lands of South Australia and Victoria were considered to be exhausted. There was no disputing the fact that land which in the early days produced from 25 to 50 bushels of wheat per acre, year after year, would not, even with bare fallowing, produce more than 10 bushels. Then came the development of the use of phosphates, and these same lands, with the application of from 80 lb. to 160 lb. of phosphates, at once doubled the yield. The simple fact was that the phosphoric acid represented the short stave and governed the crop.

Further study of the law as illustrated will show the importance of the oft-repeated contention, on the part of Professor Lowrie, Mr. Krichauff, and other writers in the *Garden and Field* and elsewhere, that the most careful lookout must be kept to keep on the track of the lowest stave, *i.e.*, the plant food or condition which forms the minimum.

Our conviction is that the minimum in many of the wetter districts is governed by the deficiency of lime, but as a rule on farming lands the minimum (apart from water) is either phosphoric acid, potash, or nitrogen. In a general way the other staves are high enough, and it is the farmer's duty by experiment to continually test the needs of the soil for these plant foods.

So far as Australia is concerned, we believe the above graphic illustration is absolutely original, and we are sure that readers of the *Garden and Field* will appreciate, as we do, the value of our old friend Mr. Krichauff's thought in sending it. The application of the law is our own.

THE FIRESTICK ON THE FARM.

By S. C. VOLLER.

A timely paragraph in February *Journal* on "Garden Manures Wasted" calls to mind the too frequent use of the firestick on our farms. At odd times there are some things which it may pay to burn, but in a general way all the litter, rubbish, waste straw, refuse from crops of all kinds, old crops of weeds and grass should either be ploughed in for the good of the land or stacked away to make manure. The latter end may be best accomplished by using the stuff referred to for bedding for pigs, horses, and cows.

There are a few farms yet in Queensland where proper care is not observed in the matter of bedding stock! Look at the pigstyes in some places! Bare slabs or logs, sometimes in position as a floor, sometimes tossed about in confusion, with all the intervening space mud, mud, mud! A pig, or a number of pigs, can't be too comfortable in a place like this! And even in dry weather, supposing the mud is not there, the conditions are not what they ought to be. A good floor, under a sound roof, and an ample supply of bedding kept up and regularly cleaned out, will not only make a difference to the occupant of the sty, but very soon make a difference to the manure heap, and a good manure heap soon makes a difference on the farm. The question of housing and bedding stock will make matter for another article by itself, but the question of utilisation of much that is ruthlessly burned comes in here and deserves looking at.

Of course, I know many readers will smile at what I am writing, and remark that we have any number of farms on our good country that don't want manuring!

My reply is that we also have a terrible lot that do want it, and even in regard to our splendid rich country I may say that, while it does not, perhaps, require manuring in the strict sense of fertilisation, I have yet to see the class of country that will not suffer sooner or later by the everlasting burning of stuff, or that will not be vastly improved by the return to the soil of all that is wasted in this way.

The deterioration in general character of soil, which takes place where burning is persistently followed up, may well be illustrated by an incident within my own experience. I was discussing farms and crops in a certain district one day with a friend, and he remarked that the land seemed to be altering in character from what it had been a few years previously. Results were not nearly so good, particularly in certain crops. He said, "There is So-and-So's farm," mentioning one that I knew as having a good reputation, "it used to grow the best potatoes in the district, and now it will hardly grow any." Complaint was made that the land had become "boney," and used to set hard. I

quietly asked what the farmers about there did with all their cornstalks and rubbish, and the reply was, "Oh, they burn all that." There was the trouble; and how any farmer can go on year after year without using his eyes and brains and noticing how Nature works in the turning of waste and rubbish of all sorts into good soil, I can't imagine!

How any farmer can expect to succeed in his work and maintain the fertility of his land under the constant process of burning all the waste about the farm, I don't know. The improvement which comes about through the return to the soil of all this material is wonderful. Sandy soils or soils of a gravelly or gritty nature want *feeding* in this way liberally, and will give a great response, because, however strong they may be in useful mineral or inorganic qualities, they are frequently deficient, sometimes remarkably so, in organic matter, which is thus supplied. Then when this supply is given a balance of general fertility is more nearly attained, and crops are better supplied with the all-round plant food they require. Then, again, while what we call the process of decay is going on of all this waste matter put into the soil, Nature is doing wonders, because, through the action of moisture, certain acids are developed, which act and react on the more or less crude constituents of the soil, altering their character as well as their combination, so as to render available for plant food much that before was unavailable.

Stiff and heavy lands are improved, especially with the aid of deep and thorough cultivation, by the turning in of all this waste matter, inasmuch as the blending of it with the soil makes a better mould, makes the land quite a different thing to work, enables it to retain moisture much longer, and prevents the hard setting which so often interferes with the health and full productiveness of crops. Look at Nature, and, from a handful of *débris* in a watertable or gully right up to our grand alluvial deposits along our rivers, you see the same thing working out!

Nature is always making and remaking, and we on the land have got to do likewise.

We cannot expect to keep on taking out without putting something in, and the matter is worth a little careful study. By all means stop the firestick business.

HONEY BEER OR MEAD.

This old-fashioned drink is becoming more popular, probably owing to the fact that it is made to suit the palate of most people who can drink a glass of wine, and do not mind dreaming of honey and the honey bee at the same time. The strength is regulated by the amount of honey per gallon of water used. Three pounds will produce a wine suitable for general use; while 4 lb. will give one that is certainly better and will keep longer.

Take 3 or 4 lb. of honey per gallon according to the quantity required. Mix it with the water and then boil it, removing the scum until none is left. Now add $\frac{1}{2}$ oz. of hops for each gallon of liquid, and boil for a quarter to half an hour. Drain the liquor while hot into a clean barrel, and when lukewarm stir in half a cupful of yeast. Let it work, but fill up as the froth runs over, and bung down when fermentation has ceased.

Another: Use 3 lb. of honey and 2 lemon peels to each gallon of water, boil for half an hour and skim well; put in lemon peel just before boiling ceases, work with yeast, and then put it into a cask, leaving the bung out till fermentation is over. It is also made without the addition of yeast. After boiling and skimming, add the hops to taste; strain and put into the cask, when cool. Keep it in a cool dry place, and put in the bung in a few days.

The late Mr. Abbott said that honey not properly ripened had a faculty for making itself into mead; and the mead so made, without fuss or admixture of any kind, is of the choicest flavour, uncontaminated by yeast or other aid to fermentation, and if bottled at the right time is a "nectar fit for the gods."

Dairying.

SILAGE V. CURED FODDER.

Amongst other experiments in connection with the relative value of foods for dairy stock, having especial reference to milk-producing qualities, the Experiment Station authorities, at Vermont and Wisconsin, have carried out some important experiments with silage and cured fodder. Of a crop of maize one-half was cured and the other half converted into silage. When the silage was ready, the two fodders were fed to dairy cows, each with an equal quantity of hay and grain. The results were most pronounced, and should be carefully noted by our dairy farmers. At the Vermont Station the silage ration gave 837 lb. more milk than was produced by the dry fodder, which was equal to 11 per cent. increase. At the Wisconsin Station the silage yielded 377 lb. more milk and 221 lb. fat, a difference in favour of the silage of 5 per cent. in milk and 6 per cent. in butter fat. This is an experiment which every owner of dairy stock can make for himself if he has, as he should have, a silo. Such increases as are here given should, in the case of a man milking 40 or 50 cows, make an appreciable difference in the monthly cheque from the factory.

DETECTION OF MARGARINE IN BUTTER.

It has been stated, on the highest analytical authority in Great Britain, that there is no method known by which it can be determined if margarine has been mixed with butter. Not only so, but we are not even on the straight road to find any such method. About two years ago a committee was appointed by the Board of Agriculture, under the chairmanship of Sir Horace Plunkett. This committee was given the task of drawing up regulations for the prevention of the adulteration of butter. What result followed? The committee made negative discoveries. They found that whilst the usual tests were infallible in distinguishing between butter and margarine, yet when it came to the detecting of small quantities, such as from 5 to 15 per cent. of foreign fat in butter, the tests broke down. They also found that, despite the frequent prosecutions under the Sale of Food and Drugs Acts and under the Margarine Act, the present laws have not succeeded in preventing the substitution of margarine for butter by the retailer, or in stopping the illicit mixture of margarine with butter. They also found that it was matter of common knowledge in Holland that butter from Brabant, where the majority of the margarine factories are situated, has been adulterated for years, and that butter is sold from Friesland to be taken to Brabant for the purpose of being mixed with margarine and then shipped to England as butter.

How was the difficulty to be met? A doctor once said he could not cure a patient of a certain disease as he could not diagnose it, but he would inoculate him with another and cure him of that. As the tests fail to detect the margarine, something would have to be done to make its presence known, so, on the committee's advice, 16 per cent. was determined on as the limit for the proportion of water in butter, and, as is done in Germany, Austria, and Belgium, it was enacted that all margarine shall contain a proportion of sesamé oil, which is readily detected, even in very small quantities, by chemical methods. The committee advised—

1. That if the amount of volatile acids in any sample should fall below the figure 24 arrived at by the Reichert-Wollny method, a presumption should be raised that the butter is not genuine.
2. That the use of 10 per cent. of sesamé oil in the manufacture of margarine be made compulsory.
3. That steps should be taken to obtain international co-operation.

Much of this butter has possibly been palmed off on the public as Danish. The butter retailers in England may as indignantly deny selling Australian butter, as the London butchers denied selling Australian meat. But the Australian butter is as good and as pure as Danish, as is proved by one parcel at least having topped the Danish price of 110s. per cwt. Yet we learn from the English papers that whilst Danish butter was fetching 115s. per cwt. in January last, Australian was selling at only 94s. and 96s. It is, however, but fair to say that this was the price of old stocks. Some butter sent home by the Oratava in December brought 111s. per cwt. At all events, Australian butter will never be found to contain margarine or any other illegal butter fat, unless such is added after it reaches the retail seller.

HOW TO SELECT A DAIRY COW.

An inexperienced man should always leave the selection of a cow to someone else, if he is acquainted with any person of experience whom he can trust. A man who buys a cow knowing nothing either of value or points is like an inexperienced amateur who acts as his own lawyer. The object in buying a cow is naturally that of endeavouring to obtain an animal which will produce a large quantity of rich milk. There are many who insist that it is impossible to obtain quantity and quality in the same animal; modern practice, however, has dispelled this illusion. But these points are not all. The practical man requires a cow which has a long life before her, which is healthy and well bred, and which is likely to realise something in case of accident. The richest milk is produced by Jerseys, Guernseys, and Devons, although among all other breeds there are individual cows which produce very rich milk. Among the Shorthorns, Ayrshires, Red Polls, and common cattle are many which are deep milkers, but which yield poor milk. The question is how to discriminate and to select an economical and consequently profitable animal. A cow should be well formed, yet perfect form is not an essential point in a deep milker. We should, however, look to smallish horns of fine make, a broad muzzle, depth or thickness through the heart, a fairly large abdomen, fine withers and fore-quarters, especially a slender neck and a long head, breadth across the hips, and plenty of width between the buttocks, which gives room for the udder. The udder itself should be broad from flank to flank, and long from the base of the abdomen to the extreme rear. It should be rather flat or globular than pendent. The Ayrshire possesses an exceptionally flat udder; the Jersey, a globular one; but many common cows possess huge, fleshy, pendent udders, which are as large after milking as they are before milking; whereas in the well-bred cow the udder is thin and shrinks to nothing after the milk has been extracted. The teats should be wide apart and of fairly good size. There must be vitality and vigour, plenty of appetite—for a cow should be a good feeder—with good digestion, and all this necessitates room in the thorax or forequarters for the lungs, heart, and liver. Evidence should be given, if necessary, as to when the cow has calved. To ascertain that she is a good milker it is best to visit her at milking time, unexpected by the cowman, that her milk may be measured, and that she may be seen during milking, for many cows are kickers and troublesome. The udder should be well stripped and the milk tested if possible. A big milker yielding rich milk may be worth £10 more than an ordinary cow; in other words, she may yield £10 more produce in a year and cost no more to feed. No money is better spent in stock of this character than an extra pound or two as between a big milker and a small milker. The average yield of the cows of England is about 440 gallons, but cows can be purchased which yield from 700 to 1,000 gallons, although, naturally, the owners of the very best are usually unwilling to sell unless at quite high prices.—*Agricultural Gazette*, London.

THE DAIRY HERD.—QUEENSLAND AGRICULTURAL COLLEGE.

RETURNS FROM 1ST TO 31ST JANUARY, 1904.

Name of Cow.	Breed.	Date of Calving.	Yield of Milk.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Annie Laurie	Ayrshire	10 Nov., 1903	1,054	3.7	43.6	
Amy	"	14 Feb. "	460	3.9	17.9	
Blink	"	27 April "	102	4.9	5.5	
Bonnie	"	19 Nov. "	560	3.8	23.8	
Cocky	"	16 Nov. "	685	3.6	27.6	
Leesome	"	28 Feb. "	702	3.6	28.30	
Lena	"	27 Feb. "	503	3.9	21.97	
Laverock	"	18 Aug. "	714	3.9	31.18	
Lottie	"	28 Aug. "	532	3.6	21.45	With first calf
Lulu	"	26 Oct. "	466	3.8	19.83	With first calf
Lavinia	"	17 Nov. "	1,108	3.7	45.91	
Laura	"	29 Nov. "	784	3.5	30.73	
Luck	"	8 Nov. "	497	3.8	21.15	With first calf
Rosebud	"	20 Dec. "	612	3.8	26.04	
Ruth	"	20 Dec. "	845	3.6	22.87	
Blanche	"	17 Oct. "	384	3.6	15.48	
Rea'm	"	29 Dec. "	623	3.7	25.81	
Lightning	"	15 Jan., 1904	312	3.8	13.27	With first calf
Linnety	"	8 Jan. "	558	3.8	23.74	
Ruby	"	28 Jan. "	203	3.6	8.18	
Bell	Jersey	18 July, 1903	381	4.6	19.6	
Connie	"	5 May "	470	4.8	25.2	
Cocoa	"	7 Nov. "	462	4.0	20.69	With first calf
Carrie	"	20 Nov. "	623	4.3	30.0	
Effie	"	25 Dec., 1902	218	5.0	12.20	
Eileen	"	16 June, 1903	373	4.6	19.11	
Playful	"	7 July "	642	4.3	30.91	
Tiny	"	1 Dec. "	523	4.6	26.94	
Stumpy	"	3 June "	540	4.3	26.20	
Ivy	"	1 Jan., 1904	540	4.4	26.61	
Alice	Shorthorn	28 April, 1903	558	4.0	24.9	
Chocolate	"	11 Nov. "	603	3.6	24.31	With first calf
Dott	"	28 Sept. "	711	3.7	29.4	
Gumea	"	18 Nov. "	880	3.7	36.46	
Louisa	"	1 Jan., 1904	568	3.9	24.58	
Lucy	"	18 Oct., 1903	711	3.7	29.47	
May	"	20 Mar. "	740	3.8	31.49	
Princess	"	18 Nov. "	652	3.6	26.32	
Rose	"	21 July "	563	3.9	24.59	
Tottie	"	11 July "	537	3.6	21.65	With first calf
Kathleen	"	4 Jan., 1904	535	3.7	22.17	With first calf
Lady Vixen	"	16 Jan. "	285	3.8	12.12	
Nestor	"	8 Jan., 1904	484	3.6	19.51	
Winnie	"	7 Oct., 1903	722	3.8	3.05	
Haze	Grade Shorthorn	1 June "	461	3.6	18.48	
Lemon	"	19 July "	486	3.8	20.68	
Rowly	"	27 May "	225	4.1	10.33	
Jeanie	"	10 Jan., 1904	476	3.6	19.06	
Whitefoot	Holstein Devon...	10 Aug., 1903	488	3.8	20.79	
Night	"	13 Aug. "	472	3.6	18.93	
Magpie	Holstein Sh'rt'h'rn	14 May "	481	3.5	18.85	
Mona	"	8 Aug. "	815	3.6	32.86	
Reanie	"	2 S-pt. "	666	3.6	26.85	
Drone	Ayrshire Sh'rt'h'rn	7 Oct. "	532	3.8	22.64	
Nancy	"	12 April "	533	3.9	23.28	
Ping Pong	"	18 July "	458	3.7	18.87	With first calf
Mince	"	4 Dec. "	604	3.7	25.02	With first calf
No. 46	"	8 April "	341	3.8	14.51	With first calf
Nada	"	12 Jan., 1904	332	3.7	13.75	With first calf
Rita	"	17 Oct., 1903	536	3.7	22.21	With first calf
Blank	Ayrshire Jersey	25 Mar. "	150	5.2	8.7	
Ohio	"	12 July "	251	4.4	12.36	
Brindle	Jersey Grade	6 June "	732	3.9	31.9	
Pansy	"	15 July "	672	4.1	30.75	
Fancy	South Coast	14 Oct. "	1,118	3.7	46.32	
Grace	"	28 Oct. "	878	3.8	37.36	
Annie	Ayrshire	19 Jan., 1904	131	3.7	5.42	

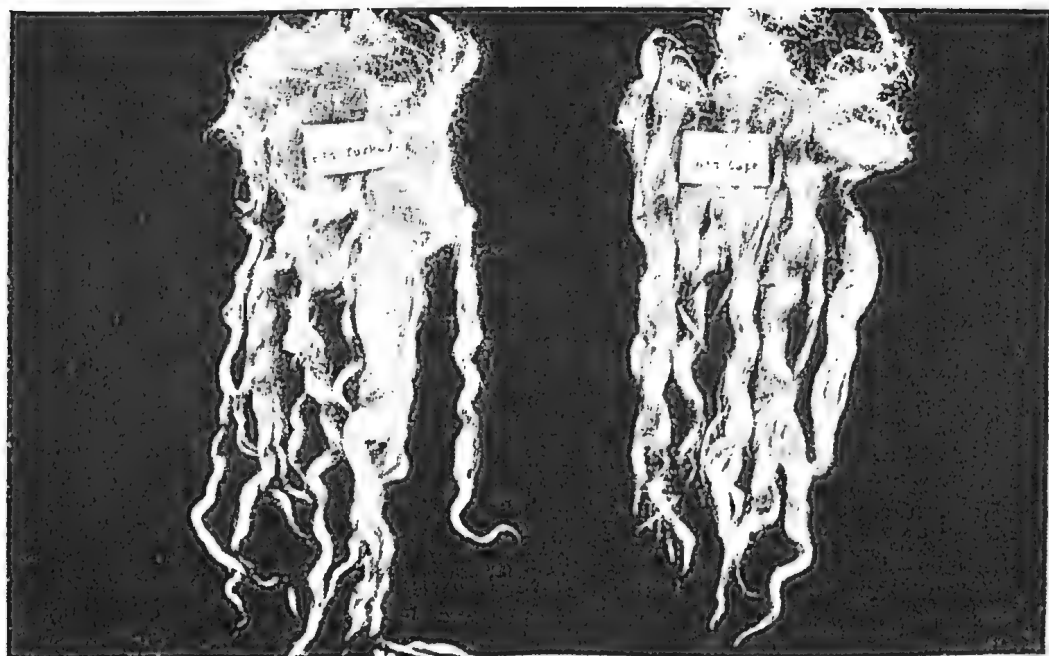
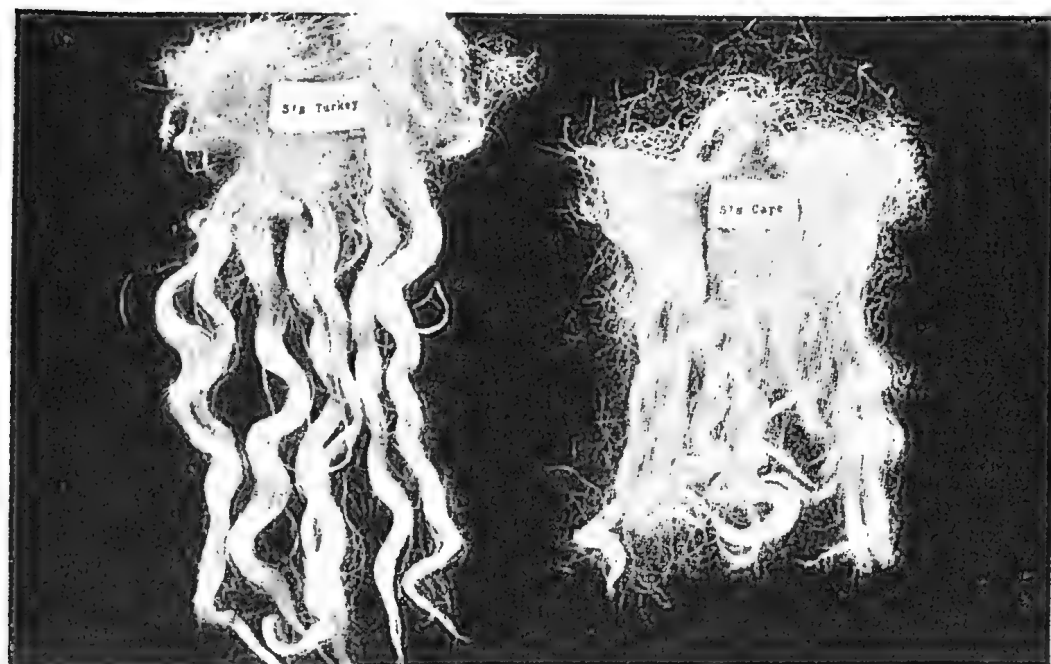
CAPE V. TURKEY MOHAIR.—TWO WELL-KNOWN QUALITIES COMPARED.

By S. B. HOLLINGS, in the *Pastoralists' Review*.

We seem at last to have come to the conclusion that Turkey and Cape mohair stand as the two leading articles of textile commerce in the mohair world, although American mohair occupies a leading position on American markets. It is quite right for Angora goatbreeders in the States to entertain lofty opinions about the increasing quantity of material which they are producing, and if they will permit a word of advice they will see to it that they increase in quality at the same ratio they are increasing in quantity. The same applies equally as forcibly to the Angora goatbreeders in South Africa as well as in Australia, for samples of Australian mohair which have been recently sent me want breeding up a great deal. Mohair is nothing if there is not associated with it a fair degree of quality, for anybody can breed fleeces which are poor and coarse, but it is hair, fine, lustrous, and bright which sells the best even to-day. It is no use breeding pig's hair and bristles, that can be met with any time at the price of an old song, but hair worthy of the name of mohair can only be grown with a mixture of brain and capital, which the modern goatbreeder should possess. Samples of mohair which have been recently sent me for examination, and which the owners seemed proud to send, have been unmistakably below even a reasonable degree of excellence, and their "non such" samples have been destined to fill a position little higher than Turkey 3's, which is about the lowest quality sorted. I have striven for years to put before readers an intelligent conception of what mohair should be like, always trying to make my articles as educative as possible, and, if to-day readers are none the better for what has been said, then I must again commence operations and try to instruct them in the way they should go. To-day I purpose to set before them the great subject of Turkey *versus* Cape mohair, and in doing so I want to consider and contrast the wide difference there is in the two articles, as set forth in the standard set up by the trade. Never before have any readers seen the subject of Cape and Turkey contrasted as the illustrations depict, and, if they are considered thoughtfully, I have no fear as to the results. I have had the photographs specially taken for this issue [of the *Review*], and they are unique in every sense of the word.

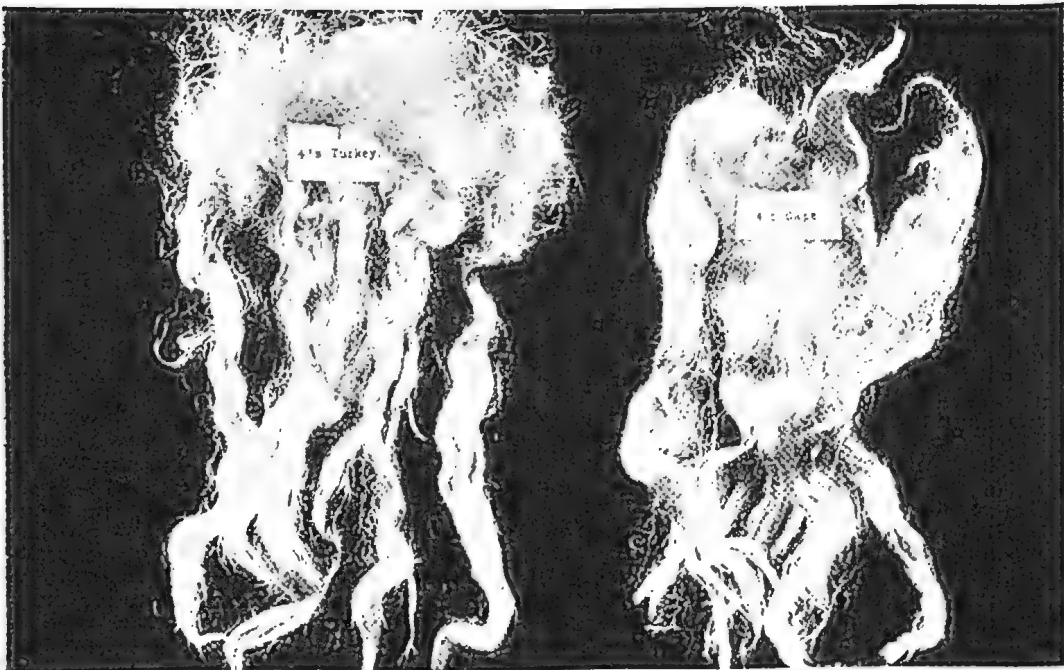
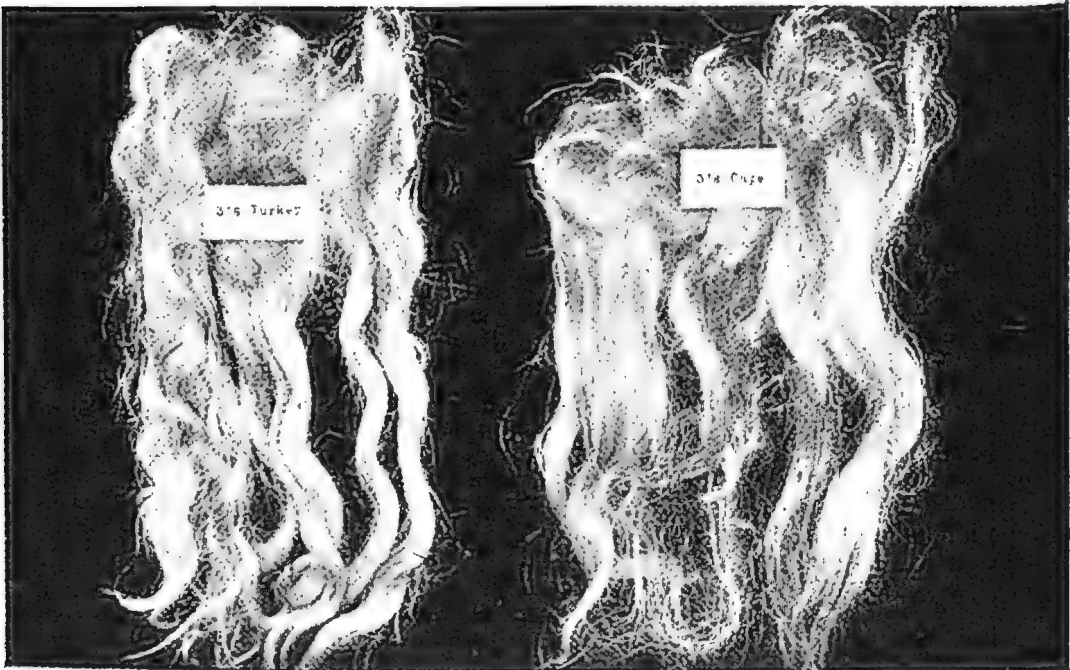
TURKEY THE STANDARD.

It has always been said by experts that there is plenty of room at the top, and, however much the coveted prize may be craved for by even the pushing Yankee breeder, Turkey mohair still undoubtedly figures "on top." There is no question of a doubt about Turkey mohair being the standard, and I for one desire to see other countries' mohair "arise and shine" as does the Turkey staple. I am not so expert in the methods which are in vogue among the Angora goatbreeders of Asia Minor as to know what they do to maintain the high standard of excellence which is found in their clips, but suffice to say that the right class of article finds its way to this country, and I cannot hear of much complaint offered by users as to the want of character of this article. There is in every move of mohair always a big weight to change hands of this staple, and when Cape is almost dead Turkey sells if mohair is wanted at all. This fact is worthy the consideration of goatbreeders in other parts of the world, and the question is worthy of being asked why this is so. Our illustrations point a strong moral to all observing persons, and I don't think, if the same standard can be got in either Australian, American, or Cape, that much complaint will be heard. Readers will clearly understand that, when there is a standard to work to, other descriptions rise or fall in so far as they come up to this standard, and the Turkey article to-day, in ranking the first, compels attention when other descriptions are found wanting on many other leading points. It is this fact which has induced me to prepare the four excellent illustrations which accompany this article. Let us now look at them.



TURKISH AND SOUTH AFRICAN MOHAIR.

Plate XIV.



TURKISH AND SOUTH AFRICAN MOHAIR.

TURKEY THREE'S.

No better illustration can be given of the disparity between one class of mohair and the other than by a glance at the first illustration. I said to one of our best mohair dealers one day, "Will you kindly give me the varied qualities in Turkey mohair, along with the corresponding qualities in Cape?" telling him the object I had in view. I only had need to ask my esteemed friend, and was readily obliged. Here we have at our first illustration Turkey 3's and Cape 3's, and if the latter had been equal to the Turkey they both would have been alike, or very nearly so. But is that so? Even to the uninitiated there is at first glance a wide difference in the two pictures, and the casual observer will see at once the marked difference there is in the two qualities. I should say here that 3's is about the lowest standard of Turkey that is sorted in Bradford, and is looked upon as being very low. But look at the staples of the two descriptions of mohair. In the original photograph we have kemps galore in the Cape, which can be identified as being considerably lighter in appearance than the mohair fibre itself. There are a few present in the Turkey sample, but nothing near so many as in the Cape. Then contrast the difference in the length of the staples. The Turkey would be about 8 inches, and the Cape not more than 6 inches. No man would ever buy the latter if he could command Turkey 3's at the same price as Cape 3's, simply because of the superiority of the Asiatic staple. Nor is this all. We have an altogether finer quality in the Turkey compared with the Cape, and as proof of this notice that the Turkey staple "curls" far more than the Cape, which is almost straight. It can be taken as almost an infallible proof of a lack of quality in either wool or mohair when the staples hang straight down as they do in this photograph, and any man with a grain of common sense can see at once that this Turkey sample is altogether superior in every way to the Cape. Let no reader think that there was any discrimination in choosing these staples, or that they were specially selected to illustrate my point. Nothing of the sort. Every staple was taken haphazard out of a parcel selected by somebody else, hence no degree of favouritism can be charged home to me by any reader. I set out with the best of intentions on purpose to secure samples showing the difference between the two articles, and I say emphatically that these Cape 3's are vastly inferior to the Turkey 3's.

QUALITY FOUR'S.

We now look at Turkey 4's, and place the corresponding quality in the Cape article, and it will be seen that we are getting finer in fibre already. We have an altogether bolder staple, particularly in the Cape, and I am rather sorry that the entire length is not in the photograph, the ends of the staple being rather shortened. However, that does not in the least detract from the quality of the illustration. It will be seen that still the Turkey is finer in proportion than is the Cape, and here again we have a corresponding longer staple and more combing property about it. There is decidedly more character in the Asiatic mohair, the staples being somewhat thinner in bulk, and still more "ringlety" than the Cape. It will spin to a fair count, though there is no reason why Cape should not be equal in every point with the Turkey.

DEFICIENCY OF CAPE FIVE'S.

Our fifth illustration comes out very well, and had Cape 5's been what they should be, there would have been very little room for complaint. Let the reader look at them in particular. There is a finer quality, and I think that in this one respect it more nearly approaches Turkey 5's than any of the previous illustrations have done. But there is a significant absence of length, of which my esteemed friend, Mr. Amos Crabtree—one of Bradford's leading mohair merchants—complained so strongly a few years ago. This Turkey sample would be in average at least $1\frac{1}{2}$ to 2 inches longer than the Cape sample, and this is an important item, both from a dealer's and spinner's standpoint. When the best classes of yarn are required, it is absolutely

essential that we have a fair length of staple to spin from, and this wanting it handicaps a spinner considerably, and a topmaker who is offering the top finds that he has a good penny per lb. knocked out of the top because of its shortness. This point needs watching minutely by every Angora goatbreeder the wide world over. "Give us some length," is what every mohair merchant says, and they are right.

It will be seen that again, as proof of the better quality of the Turkey, we have more "curl" in the staple, while they come more straight out to a point than do the Capes. Cape breeders I find have a strong liking to see the end of the staple almost as thick as the bottom; they want every fibre to grow exactly the same length to the very end without the staple coming to a thin point, as in the case of Turkey. Now this I describe as a "huge" mistake, for no man ever yet saw a good fleece of wool or mohair but what came to a thin point as is seen in Turkey 5's and 6's. The oldest mohair merchant in Bradford, and practically the father of the industry—I refer to the late Mr. Thomas Crabtree—once explained to the writer that whenever he saw a fleece of mohair that came out with the ends something like a needle point, that mohair was always good. There is a wonderful difference in 5's quality mohair, as depicted in the illustration, and the two varieties are worthy of being carefully studied. Any man would give the preference to the Turkey sample as possessing more sound characteristics, and for general excellence and good useful properties it certainly beats the Cape. This quality of mohair is known as "good Turkey average," and is considered a standard article in the trade. Owing to a longer length and a few degrees finer quality, there is usually a difference on an average of $1\frac{1}{2}$ d. per lb. between Cape firsts and Turkey average.

THE HIGHEST GRADE.

Looking at 6's quality, we have here the highest grade that is grown, and is usually looked upon as "matching." This really is super Turkey, and very little indeed is found among Cape produce. It will be seen from the illustration that we have an excellent quality, plenty of curl, everything about the staple indicating a high degree of excellence. I do not know that I would suggest to breeders the advisability of going after this quality tooth and nail, for it is only when there is a high-class lustre dress trade doing that this quality is really in demand, and then Angora and Beybazar goats can just about supply the demand. A quality equal to "Turkey average" is what may be called good general purpose mohair, and around this let breeders establish and shape their programme. Again I say, Look well to your goats, and give us good useful mohair.

WHITE CARROTS AS A FODDER FOR DAIRY CATTLE.

By J. MAHON, Principal, Queensland Agricultural College.

An area of $3\frac{1}{2}$ acres of the above crop was planted at the College last season, which is now returning a yield of 40 tons to the acre. The roots have been fed, with good results, to horses, milch cows, and pigs. An analysis of the carrots shows 84.4 per cent. of moisture and 15.6 per cent. of solid matter. The roots keep well, especially when left in the ground. It was found that swede turnips decayed rapidly when the hot weather came on, whereas the carrots and mangolds suffered little. The following are the particulars with regard to feeding to milch cows:—Four cows were kept apart and a weighed quantity of carrots was fed to them, a record being kept of the milk and butter fat yields. For a period of eight days previous to feeding on the carrots, the cows were grazed on natural pasturage, and a record of the yield was kept. For a further period of eight days they were allowed the same pasturage, and had a daily allowance of carrots, as particularised in Table I. For another period of eight days they were fed exclusively on carrots, and were kept in a small enclosure where only rough dry grass was to be had. From the tables forwarded herewith, it will be seen that when carrots were fed as an additional ration to natural pasturage an increased yield was the result. When fed almost

exclusively on carrots and deprived of grazing on natural grasses, the yield diminished. The carrots were eaten greedily, seemed to act as a tonic, and improved the coat and condition of the animals.

TABLE I.

Showing DAILY YIELDS of MILK and COMMERCIAL BUTTER as computed by BABCOCK TEST, also TOTAL YIELDS of MILK and BUTTER, for a period of EIGHT DAYS, during which time the COWS were fed on NATURAL PASTURE only.

No. of Cow.	1.			2.			3.			4.			5.		
	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.
1	27	3.8	1.14	27	3.7	1.11	26	3.6	1.04	28	3.8	1.19	29	3.7	1.20
2	31	3.6	1.24	33	3.8	1.40	30	3.7	1.24	31	3.6	1.24	33	3.7	1.36
3	28	3.9	1.22	29	3.9	1.26	30	3.8	1.27	29	3.6	1.23	29	3.9	1.26
4	34	3.5	1.33	33	3.6	1.33	34	3.6	1.37	35	3.7	1.45	34	3.8	1.44
Total daily yields	120	...	4.93	122	...	5.10	120	...	4.92	123	...	5.11	125	...	5.26

No. of Cow.	6.			7.			8.			Total Yields for period of Eight Days.	
	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Commercial Butter.
1	28	3.7	1.18	28	3.8	1.19	29	3.6	1.23	222	9.28
2	31	3.8	1.31	32	3.7	1.32	33	3.6	1.33	254	10.44
3	28	3.9	1.22	30	3.8	1.27	29	3.7	1.20	232	9.93
4	36	3.9	1.56	35	3.8	1.49	35	3.6	1.52	276	11.48
Total daily yields	123	...	5.27	125	...	5.26	126	...	5.29	984	41.13

TABLE II.

Showing DAILY YIELDS of MILK and COMMERCIAL BUTTER as computed by BABCOCK TEST, also TOTAL YIELDS of MILK and BUTTER, for a period of EIGHT DAYS, during which time the COWS were allowed to run on same pasture ground, and received a SUPPLEMENTARY RATION of WHITE CARROTS.

No. of Cow.	1.			2.			3.			4.			5.		
	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.
1	26	3.7	1.07	28	3.9	1.22	29	3.8	1.23	29	3.8	1.23	30	3.7	1.24
2	32	3.8	1.36	32	3.7	1.32	33	3.9	1.44	33	4.0	1.49	34	3.8	1.44
3	27	4.0	1.23	29	3.8	1.23	31	3.9	1.35	30	3.8	1.27	31	3.7	1.28
4	38	3.6	1.53	36	3.5	1.41	36	3.5	1.41	37	3.6	1.49	38	3.7	1.57
Total daily yields	123	...	5.19	125	...	5.18	129	...	5.43	129	...	5.39	133	...	5.53

No. of Cow.	6.			7.			8.			Total Yields for period of Eight Days.	
	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Commercial Butter.
1	31	3.8	1.31	30	3.7	1.24	31	3.6	1.24	234	9.78
2	35	3.7	1.45	34	3.7	1.40	33	3.8	1.40	266	11.21
3	32	3.8	1.36	31	3.9	1.35	32	4.0	1.43	243	10.50
4	39	3.6	1.57	38	3.7	1.57	39	3.7	1.61	301	12.16
Total daily yields	137	...	5.69	133	...	5.56	135	...	5.68	1,044	43.65

TABLE III.

Showing DAILY YIELDS of MILK and COMMERCIAL BUTTER as computed by BABCOCK TEST, also TOTAL YIELDS of MILK and BUTTER, for a period of EIGHT DAYS, during which time the COWS were fed a DAILY RATION of CARROTS, but were not allowed to run on natural pastures.

No. of Cow.	1.			2.			3.			4.			5.		
	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.
1	27	3.7	1.11	27	3.6	1.08	28	3.8	1.19	28	3.7	1.18	27	3.7	1.11
2	32	3.6	1.29	31	3.8	1.31	30	3.7	1.24	31	3.8	1.31	33	3.8	1.40
3	27	3.9	1.17	28	3.8	1.19	29	3.9	1.26	29	3.7	1.20	28	3.7	1.18
4	36	3.6	1.45	37	3.6	1.49	36	3.7	1.49	35	3.6	1.52	34	3.7	1.40
Total daily yields	122	...	5.02	123	...	5.07	123	...	5.18	123	...	5.21	122	...	5.09

No. of Cow.	6.			7.			8.			Total Yields for period of Eight Days.	
	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Per cent. Butter Fat.	Commercial Butter.	Lb. Milk.	Commercial Butter.
1	28	3.6	1.12	28	3.7	1.18	28	3.6	1.12	221	9.09
2	32	3.7	1.32	33	3.8	1.40	32	3.7	1.32	254	10.59
3	30	3.6	1.20	29	3.8	1.23	30	3.7	1.24	230	9.67
4	36	3.6	1.45	35	3.5	1.37	36	3.6	1.45	285	11.62
Total daily yields	126	...	5.09	125	...	5.18	126	...	5.13	990	40.97

FODDER TABLE to be read in conjunction with TABLE II. (MILK YIELDS, &c.)

No. of Cow.	1st Day.	2nd Day.	3rd Day.	4th Day.	5th Day.	6th Day.	7th Day.	8th Day.	Total Consumed.
	Carrots Consumed.	Carrots Consumed.	Carrots Consumed.	Carrots Consumed.	Carrots Consumed.	Carrots Consumed.	Carrots Consumed.	Carrots Consumed.	
1	lb. 35	lb. 40	lb. 40	lb. 40	lb. 40	lb. 40	lb. 40	lb. 50	lb. 325
2	34	38	42	40	40	42	40	40	316
3	40	40	40	40	36	40	42	40	318
4	40	40	45	45	40	40	40	40	330
Total ...	149	158	167	165	156	162	162	170	1,289

FODDER TABLE to be read in conjunction with TABLE III. (MILK YIELDS, &c.)

1	65	60	70	70	70	70	70	75	550
2	60	60	65	70	70	65	70	70	530
3	70	75	70	70	70	70	70	70	565
4	75	75	75	70	70	70	70	70	575
Total ...	270	270	280	280	280	275	280	285	2,220

MILKING COMPETITIONS.

By J. MAHON, Principal, Queensland Agricultural College.

As an encouragement for the production of high-class dairy stock, the milking competitions, carried out by the committees of the agricultural societies throughout the State, cannot be too highly commended. Experience, however, proves that the conditions are such that, in many instances, the honours are not gained by the best dairy animal competing. A highly nervous temperament in the animal is usually associated with a high milk yield; the change of

location and the new surroundings disturb the cow, causing the flow of milk to suffer. Some cows, when removed from their home, fret and refuse food. The change of drinking water is in some cases not agreeable to them, and the dairyman feels annoyed at the poor yield of milk on competition days. The conditions of the competition should allow the trials to be carried out without removing the competing animals from their usual run. We quote below the milk yields of the three cows from the Agricultural College, which competed at the last Toowoomba Show, for two periods, each of seven days, preceding the date of the competition, which goes to prove that the removal of the animals resulted in a diminished yield. In this instance, however, the honours have gone to the animals entitled to them, but in many cases the results are different, and the matter is well worth the immediate attention of the gentlemen entrusted with the framing of rules for milking competitions:—

FIRST PERIOD OF SEVEN DAYS.

Name of Cow.	YIELD OF MILK IN LB. PER DAY.								Percentage Butter Fat.	Commercial Butter.
	1.	2.	3.	4.	5.	6.	7.	Total.		
Annie Laurie...	38	36	36	38	37	38	36	259	3·8	lb. 11·02
Lavina ...	38	37	39	38	41	40	39	272	3·6	10·96
Fancy ...	40½	39	40	38½	39	42	40	279	3·8	11·87

SECOND PERIOD OF SEVEN DAYS.

Annie Laurie...	37	38	39	38	40	39	40	271	3·9	11·83
Lavina ...	38	37	38	36	35	37	36	257	3·7	10·65
Fancy ...	41	41	42	41	42	43	42	292	3·7	12·10

The cows were fed on bran (steamed), oaten-meal, and molasses. Annie Laurie and Lavina are Ayrshires; Fancy, a South Coast cow.

POSSIBLE CURE FOR RED WATER.

There are many cases on record where diseases in both animals and plants, which have baffled all the efforts of animal and vegetable pathologists, have been successfully overcome by some simple remedy, generally discovered accidentally. Thus, only the other day we recorded an alleged remedy for swine fever, which was discovered by someone in South Africa, and is simplicity itself. It was stated that by this remedy (see *Journal*, Vol. XIV., p. 100, Feb., 1904) seventeen out of eighteen pigs were cured. Now, we have what we fervently hope may prove a cure for that scourge of the dairy herd—redwater.

Mr. Brittain, of Belgrave Farm, Belmont, called at this office on the 10th instant, and assured us that he had accidentally discovered an absolute cure for redwater. He had a valuable Ayrshire cow in the bail, which had developed the disease, and had been given a dose prescribed by a veterinary surgeon. Whilst in the bail, a second dose was given it, but before it could be released it dropped dead. Shortly afterwards another cow, a Shorthorn, was reported by Mr. Brittain's son as being "down" in the paddock with redwater. As soon as he saw what was the matter, he got some saltpetre and dissolved 1½ oz. in 1½ pints of water. He drenched the cow with this. Within half an hour after the dose was administered he gave it a milder dose. The cow then got up and began to feed. The evacuations resumed their normal appearance, and the cow recovered perfectly. The remarkable thing about this recovery is, that when the milk was withdrawn it was set on one side, so as not to be mixed with that of healthy cows. It was offered to a dog, who declined it. When the calf was put to the cow, the calf declined to suck, showing that the saltpetre had affected the milk. Mr. Brittain then found that, after administering the drench, the milk must not

be used for at least two days. When a cow is noticed to be going off its feed, a dose of 1 oz. only of saltpetre should be given in $1\frac{1}{2}$ pints of water; but as soon as redwater appears the saltpetre should be increased by $\frac{1}{2}$ oz.

One of Mr. Brittain's big plough horses went down with inflammation of the bowels. He administered a dose of saltpetre, and the horse recovered.

Mr. Brittain declares that the cow in question had a severe attack of redwater, and that within half an hour of receiving the dose it got up and began to feed. Farmers cannot afford to lose valuable stock, and, as this remedy is so positively recommended by our informant, we would advise others to try it. At all events, it can do no harm, especially to cattle which would in all probability die no matter what other remedies were given.

EXPORT OF BUTTER.

The total amount of butter shipped from the port of Brisbane from 8th December to 16th February is as follows:—

Per Damascus	...	...	...	...	6,000	boxes
Miltiades	...	...	...	...	7,001	"
Moravian	...	...	...	...	8,059	"
Essex	...	...	...	...	4,000	"
Everton Grange	...	...	...	...	3,650	"
Haversham Grange	...	...	...	...	2,462	"
Sophocles	...	...	...	...	7,500	"
Total	...	...	...	...	38,672	"

AN INTERESTING EXPERIMENT—WATER CULTURE.

Mr. R. A. Black, Secretary to the Clarence Branch of the Council of Agriculture, of Tasmania, read a paper last December on the subject of Superphosphate of Lime. In the course of his lecture, he introduced a bottle containing a broad bean about to flower.

"Some people," he said, "are still very sceptical with regard to plants requiring certain elements, because they cannot see how anybody can watch what the roots of a plant extract from the soil. Well, to make it easy for farmers to know how chemists found what it was that plants took from the soil, I must state that plants were grown in water and not earth. First the plant would be tried in pure water, but it would soon be found that the plant would not survive; it would wither away and die after a while. Next they would add various chemicals, until they learnt the absolute requirements of the plant.

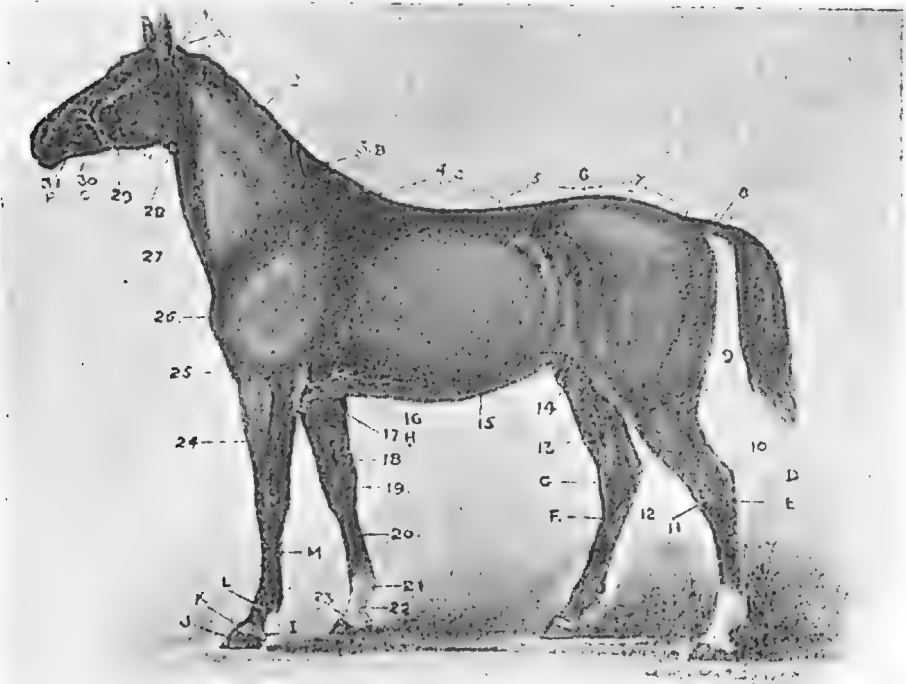
"I have here for your information a broad bean, which I have had growing in this process, called "water culture." On the 25th September I placed a germinated bean in this nutritive solution, which was made up as follows:—In this bottle I placed about a pint of distilled water and added .648 grams of nitrate of potash, .324 grams of chloride of sodium, .324 grams sulphate of magnesia, .324 grams of sulphate of lime, .324 grams phosphate of lime, and .002 grams of sulphate of iron. Thus, you see a plant can grow in water as well as in the soil, and, better still, you can watch the growth of the roots with their many ramifications. The bean is a little over two months old, and looks very healthy, and you will observe it is about to burst into flower."

This is a most interesting experiment, and one which would form a splendid object lesson to an agricultural class at college or school. The ingredients of which the solution is composed are cheap, and any chemist could make it up.

The Horse.

THE TOPOGRAPHY OF A HORSE.

We (*Farmer and Stockbreeder*) present our readers this week with a useful figure of a horse, prepared for us by a well-known veterinary artist, on which are indicated by figures the chief topographical regions or "points" in ordinary use, and by letters the locality of some of the commoner diseases or blemishes. There are, of course, many other anatomical and veterinary "landmarks," as it were, and other points at which disease may be located, but these are technical and come within the province of the skilled vet. Our plate merely serves as a kind of object lesson to the farmer, breeder, stock-keeper, stableman, coachman, and others having the care of horses:—



TOPOGRAPHICAL POINTS.

1. Poll or crest of skull.
2. Crest of neck or mane.
3. Withers.
4. Back.
5. Loins.
6. Point of haunch or hip bone.
7. Croup.
8. Dock of tail.
9. Buttock.
10. Point of hock.
11. Hock joint.
12. Wart or chestnut.
13. Internal saphena vein.
14. Stifle joint.

15. Abdomen and belly.
16. Spur vein.
17. Point of elbow.
18. Wart or chestnut.
19. Knee joint or carpus.
20. Shank or cannon bone.
21. Fetlock.
22. Pastern.
23. Coronet.
24. Forearm.
25. Chest.
26. Point of shoulder.
27. Jugular groove.
28. Throat or windpipe.
29. Ligomatic ridge.
30. Facial vein and artery.
31. Gape or angle of mouth.

LOCATION OF DISEASE OR BLEMISH.

- A. Poll evil.
- B. Fistulous withers.
- C. Sore back, due to bad-fitting harness, &c.
- D. Capped hock.
- E. Curby hocks, thoroughpin.
- F. Bone spavin.
- G. Bog spavin, &c.
- H. Capped elbow.
- I. Sidebone.
- J. Sandcrack, seedy toe, &c.
- K. Quittor or fistulous coronet.
- L. Ringbone, windgalls, &c.
- M. Splint spavin.
- N. Under the tongue and between the angles of the lower jaw a swelling may be observed in young horses, due to strangles.
- O. Fistulous veins.
- P. The gape is often fistulous, sore, and warty, due to bad bits, bearing reins, &c.

THE REGISTRATION OF STALLIONS.

By ERNEST A. SMITH.

The first step to be taken toward the improvement of our horse stock is to find out our resources in the way of thoroughbred stallions. Incredible as it may appear, there exists at the present time no record of the number of stallions in this State, or, in fact, any particulars at all about them. The stock returns, which are collected annually, are silent as to the number of entires among the total number of horses, and this seems to be a serious omission in past years, which should be rectified at as early a date as possible. Though the returns for the present year are probably well under weigh, it should be no difficult matter for the various stock inspectors, or even the police magistrates, to give the Department some sort of an idea as to the stallions in their respective districts, leaving a more perfect classification until the annual collection of returns at the beginning of next year. If a Bill were brought into Parliament to give effect to the recommendations of the Hon. J. T. Bell's Select Committee on the improvement of our horses, such information will be necessary, for otherwise legislation for a Stallion Tax would be a leap in the dark with a vengeance, as there would be no means of knowing what the pecuniary result of such a tax would be. Unless all such information were ready, the fate of such

a measure would appear to be very doubtful. As it is, much precious time has already been lost, and, in spite of the Select Committee and a large amount of correspondence, we are unfortunately not one step nearer to the accomplishment of any improvement than we were some months ago. It is to be regretted that the importance of the subject does not seem to be recognised, for if there is one profitable industry which needs direction and encouragement it is that of breeding useful horses under present conditions. I would, however, point out that, while the collection of stallion statistics and their registration must be the initial step in the path of progress, the second step should be the inspection by a competent judge or judges and a veterinary surgeon. The stallions should then be classified, and their owners should be assessed or taxed accordingly. By this means, a fund would be raised for providing premiums for the most suitable stallions for improving the breed. I cannot do better than quote here the programme of the (English) Royal Commission on Horse-breeding for 1904, which has received the sanction of His Majesty the King:—

“The commissioners have decided upon twenty-three premiums of £150 each being allotted to England and Wales and five to Scotland. The conditions of the competitions for these premiums are confined to horses between four and twenty years of age, and each stallion winning a premium must serve, if required, not less than fifty half-bred mares during the season of 1904, at a fee not exceeding 40s. for each mare and 2s. 6d. to the groom, the stallion to stand or travel, as the commissioners may direct, in the district for which he is exhibited.”

Here we have a scheme that could be easily put into force, modified in its conditions so as to be applicable to Queensland. Premiums of £100 would probably be ample here, and if twenty of them were distributed the sum required for this purpose would only be £2,000, which would probably be more than provided for by a stallion assessment or registration fee, and would be capable of expansion according to circumstances later on. There can be no doubt that a portion of the Totalisator Tax ought to be devoted to the encouragement of horse-breeding, as is done in France and other places where the totalisator or Paris-Mutuel is in use, and, with returning prosperity and improved finances, the necessity for this will probably be recognised. Regarding the registration and proper classification of stallions, a correspondent of the *Live Stock Journal* writes as follows:—

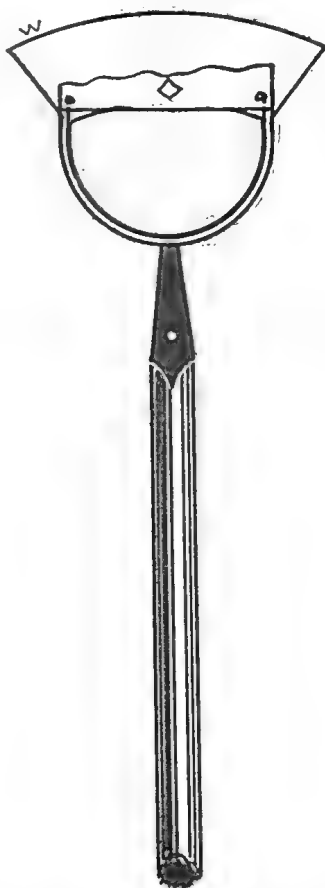
“If ‘the liberty of the subject’ may be reasonably interfered with, in the public interest, in the case of contagious diseases, why must it be regarded as sacred in the case of hereditary disease, which, if allowed to spread uncontrolled through the studs and herds of the country, must prove seriously prejudicial to the same public interest? Also, unsound stallions travelling a district at low fees tend to exclude, by competition, more expensive because sound and more costly horses, thus indirectly compelling farmers either to use the former or to incur the heavy extra expense of sending their mares away to better horses. If the unsound were debarred from serving, the demand would bring sound horses into reach near home.”

These arguments are practically unanswerable, and should commend themselves to all those who still hold the opinion that their private interests are to be preferred to the public good. If the proposals we have sketched out were carried into effect, the improvement of our horse stock would be plainly apparent to even those uninterested in this important subject. To such I would say:—There is money in it, and the improvement of our horse stock, combined with the proper provision for selling direct (to the exclusion of the middlemen), would not only confer a lasting benefit on the rural population of the State, but by opening up an industry, the importance of which can hardly be over-estimated, would provide a new source of wealth for our farmers and selectors, compared to which many of their agricultural products would be a mere

bagatelle.* Horses would, under the new conditions, pay better to breed than bullocks, and even those ignorant of stock matters may by this comprehend the great importance of the subject. On another page appear illustrations of two famous English stallions—Bill of Portland and Florizel II.—both of which are of a type which show that strength and quality are always combined in the best specimens of the thoroughbred. The production of such types has only been attained in England by the greatest care and unlimited expenditure, and it is to such that find their way to Australia that we have to look to the reproduction of their excellencies and for a permanent improvement in our horses.

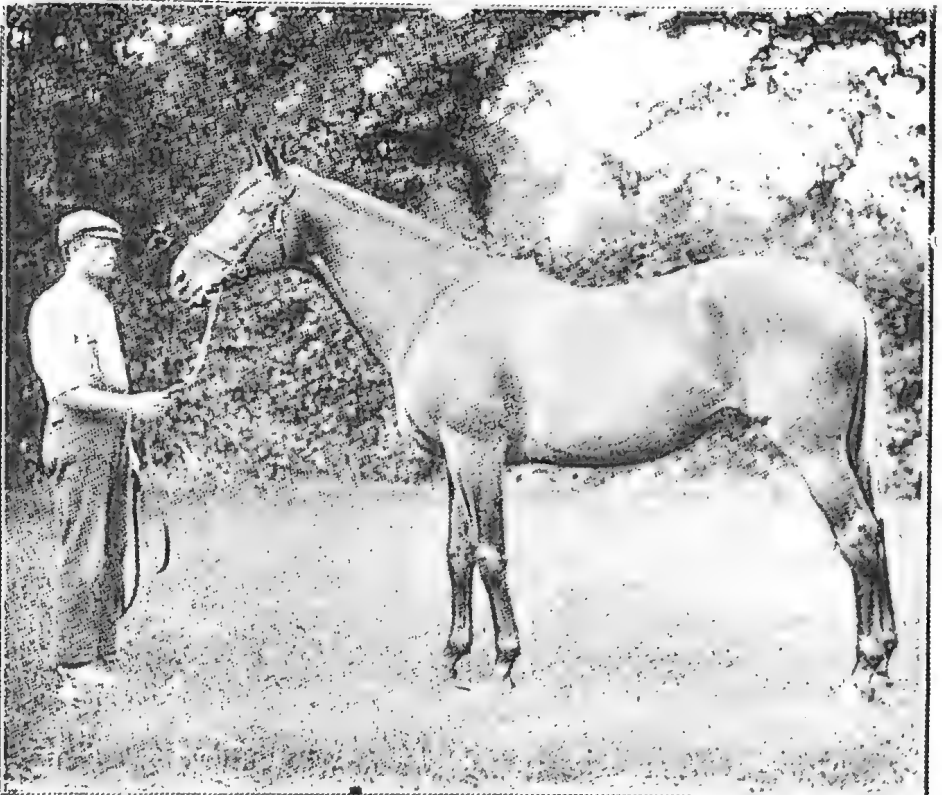
A COMBINATION HOE.

Through the courtesy of Mr. W. Mellwraith, Rockhampton, Mr. Roy Hooper, Esher, Westwood, Central Queensland, sends us the accompanying illustration of a strong combination hoe, formed of an ordinary worn-down push-hoe, and the blade of a chaff-cutter. Advantage was taken of the hole in the



cutter blade, and a second hole was made in the middle of the push-hoe blade. The attachment is firmly secured by a bolt, washer, and nut firmly screwed up. The combination hoe does excellent work where an ordinary hoe is found to be too light. The idea is a very good one, and the implement can easily be fixed up by anyone who is handy with tools.

* Mr. Smith's enthusiasm on the subject of horse-breeding leads him here to an untenable conclusion.—Ed. *Q.A.J.*



Bill of Portland, by St. Simon—Electric Light (at Northau House Stud, Herts.)



Bill of Portland, by St. Simon—Electric Light (at Northau House Stud, Herts.)

Poultry.

A HOME-MADE BROODER.

The Poultry Editor of *Station, Farm, and Garden* gives an even simpler form of brooder than that we last published a description of. Procure or make a common box about 14 inches wide and 3 feet long, and cover the bottom with felt or paroid. Line half-way up the sides with calico, cover the calico with a cloth of woollen material, tacked tight and smooth. See that the four corners are blocked and made round to prevent crowding in corners. Have a small door at the end or side of box for chickens to run in and out. The cover of box should be movable, and should be lined on the underside, and should fit nice and tight on top of brooder. Holes $\frac{1}{2}$ -inch diameter should be bored in each corner of the brooder to give sufficient air. No lamp is needed, as the brooder will be kept indoors during the night.

POULTRY IN NEW ZEALAND.

Those who have facilities for keeping and cheaply feeding poultry will do well to take to heart and act upon the advice given by Mr. Fern, Government Poultry Expert, in the illustrated lectures he is now delivering throughout the Southern Districts of the State. In New Zealand, the poultry business is rapidly advancing towards a very large export trade in poultry. The Poultry Department of that colony reports that immense orders are to hand from South Africa. At present these orders amount to 1,000,000 head of poultry, and the Department has been informed that the New Zealand poultry are considered the best of any placed on the South African market. So great is the demand for this market that the colony finds it impossible at present to keep pace with it. The shipping of eggs has slackened off, as, although the output of eggs last year from the State Poultry Farms alone was 21,000,000, the local demand absorbs them all. During the current year it is expected that the output will reach 25,000,000. We have constantly impressed on the farmers the enormous value of the poultry industry to a State, when taken in the aggregate. If 2,000 farmers and other settlers kept 100 fowls each, and each hen were to lay only 100 eggs a year, the annual output of eggs would equal that of New Zealand—say, about 20,000,000, or 1,666,666 dozen eggs. At 6d. per dozen, a sum of over £800,000 would be poured into the State. Surely this is worth considering in a country where there is ample room on farms for far more than 100 fowls per farm, and where, all the year round, there is such an abundance of cheap feed in the form of maize, chick wheat, millet, bones, &c.

POULTRY AND BEES, QUEENSLAND AGRICULTURAL COLLEGE.

The following are some particulars with regard to the above departments at the Queensland Agricultural College:—

Since 1st July we have hatched 300 chickens and a few ducks and turkeys. The new Cyphers Incubator did remarkably good work, averaging over 80 per cent. during four successive hatches, the exact figures being:—75 per cent., 80 per cent., 81 per cent., and 85.5 per cent. We have sold 56 settings of fowls' eggs, 9 settings of turkeys' eggs, and 1 of ducks' eggs for hatching purposes up to date. The poultry yard, during the last seven months, has returned

£70 16s. 11d. The fowls have laid remarkably well, the following being the records for the nine months ending 31st January, 1904, six hens to each pen:—

White Leghorns	897	Minorcas	878
Brown Leghorns... ..	895	Buff Orpingtons	875
Black Orpingtons	886	Black Spanish	857
White Wyandottes	881	Langshans	856
Silver-grey Dorkings	879	Old English Game	837
Silver-laced Wyandottes	879	Plymouth Rocks (4 months)	291

As we received the Plymouth Rocks about the middle of September, their record commenced from the 1st October. It will be noticed that the Buff Orpingtons, which beat all others last year, have not done quite so well. This may be accounted for by the fact that they were practically the same birds as last year (only one pullet being added), and, as they laid very heavily for their breed last time, they took a long rest this season, and did not commence to lay until six weeks after the others, which gave them a bad start. A full record for the twelve months is not being kept, the fowls being in heavy moult, and, in consequence, are not laying much at present. It is only fair to state that the above records are not from pullets, but from two and three year old hens (the breeding stock), and they have not been forced for a heavy egg yield. Some of the young birds are showing very good quality; they are a great improvement on last year's birds, and should consequently command a ready sale when developed. There has been no disease amongst the poultry, with the exception that a few of the late-hatched birds were slightly affected with warts.

The bees have done well this year. The College dining-hall has used 733 lb., value £9 3s. 3d.; and 25 lb., value 6s. 3d., have been sold to private houses. We have also 1,500 lb. stored, making the total amount extracted 2,258 lb., and there is more in the hives still to be extracted.

The total returns, therefore, from the two departments are as follow:—

	£	s.	d.
Returns from Poultry... ..	70	16	11
Returns from Bees	9	9	6
	£80	6	5

POULTRY MADE PROFITABLE.

HOW TO WORK AN INCUBATOR.

The following instructions to amateurs on the profitable working of an incubator are given by a practical poultry-keeper in a late issue of the *Irish Times*:—

DISAPPOINTMENT AT FIRST.

A writer in a contemporary describes the usual disappointment of amateurs who generally fail with the first trial. "The hopeful amateur buys a machine, unpacks it with a beating heart, sets it up in any spare place he can find, scours the country for eggs, and puts them into his new toy, fondly hoping that in three weeks' time he will have ninety chickens to rear. He trims his lamp, or fills the tank, as the case may be, regularly. The thermometer seems to keep pretty even. He has examined his eggs from time to time and has been sorely puzzled as to whether they contain chickens or not; and on the twenty-first day he hopes and hopes in vain that his large family will appear. Alas! poor fellow-sufferer, I feel for you, for I bought my own experience dearly, having three times failed at the sacrifice of nearly 300 eggs, in an incubator which afterwards hatched most successfully."

Do not be disappointed reader if this is your experience. Very few succeed at first. Try, try, again. We will try and help you with a few hints.

First, see that your incubator has not been damaged in transit, and if it appears all right stand it perfectly even wherever you are going to place it, and to see that it is so, test it by means of a spirit-level.

Secondly, place the machine in a well-ventilated room, or outhouse free from draughts, and where the temperature does not vary much. It is not important that it should be in a warm room, but it is important that, warm or cold, the temperature does not vary much during day or night, and that plenty of air is admitted, without blowing directly on the incubator. The space need not be large, but it must not be against a wall, or anything that would hinder a full play of air all round.

A book of instructions is usually sent with each machine, and, as a different method of working applies to each make, these instructions should be studied and fully understood before commencing to work.

The eggs should be as fresh as possible, but should not be older than a week. They should have even, sound shells, and should be from strong healthy parents.

Fill the egg-drawer or tray in even rows, so that the large end of one egg just rests on the small end of its neighbour. Then, when they are put back into the incubator, see that the lamp is burning brightly and not smoking.

Regularly, morning and evening, turn the eggs gently half over. You cannot be too gentle in all your handling of the eggs. A sudden jerk may destroy the germ.

In the morning, for the first week, the egg-drawer may be left out from five to ten minutes, and during this time the door of the incubator should be carefully closed so as to keep in the heat. On replacing the drawer, the lamp should be taken out, filled with oil, the charred part of the wick rubbed off, and replaced quickly. In the evening, after an interval of twelve hours, open the drawer, and without removing it, gently turn the eggs again.

At the end of a week test the eggs and remove any that are perfectly clear. If there are a large number of these, fresh eggs may be put in, but if only a few are unfertile it is better to let them alone. If fresh eggs are put in do not let them touch the warm ones. They should either be heated near the fire before being put in, or a little wadding placed between the warm and cold eggs. The temperature must also be slightly raised for a time as the cold eggs will tend to lower it.

As the heat of the eggs increases they may have a little more airing up to a quarter of an hour.

The thermometer should never register more than 105, nor less than 100. In sudden changes of temperature it must be frequently examined.

When the chickens are coming out do not be in a hurry to open the drawer too often. Once will be enough to remove the shells, and when they are all out they may either be removed to the drying box or left where they are for twelve hours.

Keep the door locked of the place where you have your machine, and manage it entirely yourself.

PRACTICAL POULTRY-BREEDING, No. 5.

By W. HINDES.

Now that there is a chance of exporting, poultry-breeders and farmers, would do well to commence breeding a suitable fowl for that purpose. Queensland has an ideal climate for poultry-raising, enabling us, as it does, to hatch our chickens at a suitable time to command the highest prices in the London market. The following prices for the twelve months are taken from Lewis Wright's "New Book of Poultry," and are stated to be the average prices for fatted fowls in the Leadenhall and Smithfield markets:—

January, 6s. to 10s. per pair; February, 6s. to 10s. per pair; March, 8s. to 11s. per pair; April, 10s. to 12s. per pair; May, 10s. to 13s. per pair; June, 8s. to 11s. per pair; July, 8s. to 11s. per pair; August, 5s. to 8s. per pair;

September, 6s. to 7s. 6d. per pair; October, 6s. to 7s. per pair; November, 6s. to 7s. per pair; December, 6s. to 9s. 6d. per pair.

It will be seen from the above figures that prices are highest about Easter time, which is just right for our breeding season, for, if we hatch in August or September, we would have five or six months in which to grow, and two months in which to get the poultry home. Then, for the Christmas, January, February, and March markets, we could hatch from March all through the winter, so that we could not be better situated for supplying the best markets and obtaining the highest prices, providing we send a good article. For the London market, a white-legged and white-skinned fowl is in most demand by epicures, and brings the highest price; the birds should also be as large and plump as possible at five or six months old, as they must be young to command the best price. It is no use sending an extra large-framed bird with no meat on it; what is wanted is a good proportion of flesh to give it value. Then there is an unlimited demand for good poultry in South Africa; New Zealand is doing a big business in poultry with this country at the present time. For this market, breeders need not be so particular about the white legs as in the case of the London market, provided that the birds are otherwise good; but, if we intend to build up a large and remunerative export trade, we must send first-class birds only, so that when they arrive and are sold they will bring top price, and be a good advertisement for Queensland poultry. As regards the birds suitable for export, the best results will be obtained by crossing two pure breeds. Crossbred fowls mature a little more quickly than purebreds, and, as early maturity means extra profit, our object should be to produce the greatest weight with the least amount of food. The following crosses will make a suitable bird for export:—

1. Old English Game cock, with any of the following hens:—Dorkings, Buff Orpingtons, Houdans, Plymouth Rocks, Wyandottes, Faverolles, and Brahmas.
2. Indian Game cock, with the following hens:—Dorkings, Buff Orpingtons, Houdans, and Faverolles.
3. Dorking cock, with the following hens:—Indian Game, Buff Orpingtons, Houdans, Faverolles, Plymouth Rocks, and Wyandottes.
4. Buff Orpington cock, with the following hens:—Dorkings, Indian Game, Houdans, Faverolles, Plymouth Rocks, and Wyandottes.
5. Houdan cock, with the following hens:—Dorkings, Buff Orpingtons, Indian Game, Plymouth Rocks, Faverolles, and Wyandottes.

It will be noticed that some of the breeds mentioned above have yellow legs, but no two yellow-legged birds are mated, so that the result will mostly be birds with white legs, although there will be some with yellow legs from the Indian Game, and a few from the Wyandottes.

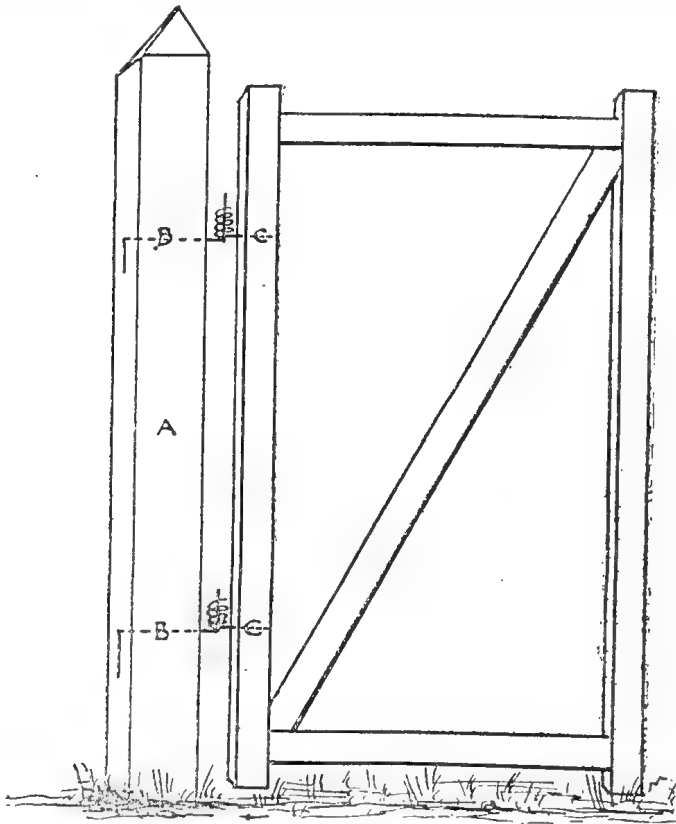
The rearing of birds is of great importance; they should be kept growing from the time they leave the shell until they are ready for market. The best system is to keep them in pens that are not too large. This is just the opposite to what is needed for breeding purposes. For our breeding birds we want large, robust frames, with plenty of muscle, and a sound constitution. For this, a good large run and plenty of exercise are required, and a growing fowl with a large run will seldom get fat, but will put the food into muscle and tissue. In a market fowl we do not want muscle so much as nice succulent meat, and by keeping the birds in moderately large runs, and giving them less exercise, we get more meat and less muscle. The feeding should also differ slightly; more soft food can be fed, and two feeds per day may be given with advantage. The soft food is more easily assimilated, and will make meat more quickly than the whole grain, although some grain will be necessary to keep the digestive organs in good order. A good variety of food should be given, as this helps to keep their appetites good. Pollard, bran, barley meal, and ground oats (ground up, husk and all, if the grinding can be done fine enough) will make a variety of soft food. This latter (ground oats) is largely

used by the Sussex fatteners in England, where it is ground up like coarse pollard in the flour-mills. These meals should be mixed, if possible, with skimmed milk, as the milk makes the flesh white, and is also a perfect food in itself. This soft food must be well mixed into a crumbly mass (not sticky). Wheat, kafir corn, barley, and a little cracked maize can be fed alternately for variety after the chickens are six weeks old; until then, the grain should be cracked, and panicum seed can also be added. They should also have a little meat or green, cut bone every day if possible, as nothing makes them grow so quickly. Vegetables of any kind should be mixed with the soft food, and will help to make up a cheap food.

Keep clean cool water always before them, and give them plenty of green food, such as cabbage and lettuce leaves or lucerne. Give plenty of shade, if the weather is hot, and keep free from lice, and the result will be a good profit.

HOME-MADE LIGHT GATE HINGE.

When it is required to hang a light gate to a poultry-yard or garden, and hinges are not procurable or cannot be fitted to a gate post, an excellent substitute for hinges may be made with stout galvanised wire. Two pieces are bent to form the staples, which are passed through a hole in the post and secured at



the back, as shown in the diagram. The hinges are formed by twisting two other pieces of wire in the form of a spiral, which is then hammered down to close it as much as possible. These two spirals are then fixed to the gate itself, which is then hung on to the staples. For a light gate, such hinges are very effective.

The Orchard.

SWEATING CITRUS FRUIT.

By ALBERT H. BENSON, M.R.A.C.

As the season for marketing citrus fruit is approaching, I deem it advisable to again draw the attention of growers to this very important question in the handling and marketing of citrus fruits. I am satisfied that the neglect of sweating the fruit thoroughly prior to packing results in serious loss to our growers, and is largely the cause of blue mould or specking. Many growers fail to recognise the importance of this work, and many who gather the fruit for two or three days before packing do not allow it to sweat properly, and, consequently, suffer loss. As I have mentioned from time to time in this *Journal* and elsewhere, the sweating of citrus fruits implies the extraction of all surplus moisture from the skins of the fruit, thus rendering it tougher, more elastic, and not so liable to bruise.

Sweated fruit can be packed much firmer in the case than unsweated, and will shrink much less, consequently it will carry much better, and will open up in better condition when it reaches its destination.

If the weather is at all wet, or the trees are full of sap, the skin of the fruit is very brittle and full of moisture, especially early in the season. When the fruit is in this condition, the slightest injury ruptures the cells of the skin, allowing moisture to escape, and permits of the introduction of the spores of the blue mold fungus, which causes the fruit to rot or speck. The spores of this fungus are always present in the air of the orchard or packing shed, so that it is of the first importance that the skins of the fruit be thoroughly dried prior to packing, as the development of the spores on the fruit is dependent on moisture being present; on a perfectly sound dry skin the spores will not develop.

Unless the fruit is sweated to dry the skins, more or less loss—often very serious loss—is bound to take place, even in the case of shipments for a journey of only a few days' duration, such as those to the Southern States, and in the case of oversea shipments thorough sweating is of vital importance. The secret of the carrying qualities of Italian lemons and oranges is the thorough method in which the fruit is handled, sweated, and packed prior to shipment, and, were the same care and attention given to our fruits, I am satisfied that they would carry equally as well.

A recent number of the *Florida Agriculturist*, in speaking of this matter, contains some very sensible remarks, put in a simple form, that can be understood by any fruit-grower. I consider the remarks worth reproducing, as they will show our orange men what the orange-growers of Florida do. The climate of the Florida orange belt is very similar to that of the coastal districts of South-eastern Queensland, and, therefore, the experience gained there is valuable to us:—

"The orange, in common with a great many other agricultural and horticultural products, must go through a 'sweat' in the initial stages of the curing process.

"Now, the orange, as long as it hangs on the tree, receives every day a large amount of moisture in the form of sap, out of which it elaborates its tissues. The residue escapes through the peel as water in the form of invisible vapour.

"Now, pluck the orange, and the supply of sap is at once and forever cut off. But the supply already inside the peel has to be disposed of. Often the peel is densely packed—to the point of splitting. The peel cannot get rid of it fast enough. The orange that has been plucked keeps up the process of

straining out the superfluous water through the peel. If it lies isolated in the packing-house, where the exuding water finds ready escape into the air, it will not collect in drops, it will not 'sweat.' But it does sweat all the same; the same amount of water escapes. But if the orange is confined in a box or a bin with others, it collects in drops, and that orange 'sweats.'

The oranges ought to be spread out thin for forty-eight hours, to allow the moisture to escape. By that time the cessation of the supply through the stem is felt, and the exudation ceases measurably. It is little less deleterious for a lot of oranges to be bulked up close together than it is for a number of human beings to be crowded in a room. They poison one another by their exhalations; and in like manner the oranges rot one another by their 'sweat.'

PRESERVING OLIVES.

In a paper on the olive industry in France, by the United States Consul at Marseilles, Mr. Robert P. Skinner, the following description is given of the method adopted in that country of preserving olives:—

The modern methods of preserving green olives, which are based upon the use of lye, were introduced into France by an Italian named Picholini, whose name has been given to one variety of tree. Until his day, olives were lightly crushed and plunged into fresh water, renewed daily for nine days, during which time their bitterness disappeared largely, when they were preserved in salt water. This method still prevails to a considerable extent in the case of olives used as condiments in this country, being cooked with meats and served in forms practically unknown in the United States.

Green olives, packed in bottles or barrels for table use, are gathered by hand in September or October in France, when they have attained their full development, and are sorted in a manner to prevent bruising, which discolours the fruit to a blue-black tint. The selected fruit is carefully picked over, all stems and leaves being removed, and is then plunged into the potash bath, which varies in different localities. Generally speaking, for each 2 lb. of fruit the composition is 2 lb. of ashes, 1 oz. of lime, and sufficient water to cover the olives, and the bath is agitated occasionally. Grape-vine ashes are generally used for the bath, but, if the fruit is to be preserved in commercial quantities, the wood ashes are replaced by crystals of carbonate of soda. M. d'Aygalières recommends that for 50 gallons of olives (which equal 110 lb.) 4 lb. of ordinary carbonate of soda should be dissolved, preferably in warm water, to hasten the operation. Into this solution are broken 4 lb. of lime and 17 lb. of fine wood ashes. Water is added until the composition develops 8 degrees by hydrometer test. The olives are immersed in this solution, and remain there five or six hours, depending upon the degree of concentration of the liquid and the size of the fruit.

The olives should be withdrawn when the solution has penetrated to the centre of the fruit, and the flesh is easily detachable from the pit. Too long an immersion softens the pulp and reduces the quality. Grocers in the olive country keep on hand a stock of "olive water," which is a simple 6-degrees solution of caustic soda, of which 5 quarts are used for each 22 lb. of fruit to be prepared.

When taken from the bath the olives are washed carefully and placed in fresh water, which is renewed night and morning for three or four days, or until the water seems clear. They are then placed in jars, bottles, or barrels, and covered with brine, made by dissolving 2.11 oz. salt in 28.2 oz. of warm water for each 2 lb. of olives. The use of aromatic herbs is now of less importance in preserving olives, but it is customary to place orange peel, laurel leaves, cloves, fennel, &c., in the brine. This is poured cold upon the olives, which remain in perfect condition.

OTHER METHODS OF PRESERVING.

Considerable quantities of olives, instead of being pickled, are freed from their kernels, stuffed with chopped anchovies, capers, and truffles, and placed in oil. There is a very satisfactory demand for this article. While every variety of olive is susceptible to this treatment, preference is given to the types with thick flesh and small kernels, such as the Lucques, Picholine, Verdale, and Amellaus varieties.

BLACK OLIVES.

The conservation of ripe black olives is much simpler than that of the green fruit. The fruit, having been picked over and freed from stems, is placed in a basin containing fine salt, in which it is stirred once or twice every day. The salt removes a coloured juice from the fruit, which carries the bitterness. In order to expedite the process, each olive is sometimes pricked with a pin. At the end of several days the fruit is washed, dried superficially, and preserved in barrels or jars in a cool place. Black olives are not covered with liquid, and are frequently offered for sale in Marseilles in large baskets, through which the air circulates freely. Before serving it is customary to dip them in a little oil. The essential precaution seems to be to refrain from touching preserved olives with the fingers, more particularly the green olives, which should be manipulated with a strainer or a perforated wooden spoon.

Generally speaking, an olive tree, of good condition, middle-aged, and properly cared for, should produce an average of a little over 30 quarts of fruit annually; the proportion of oil furnished by the olives is usually 12 per cent.

RIPENING PERSIMMONS.

An American farmer has, according to his statement to the *Florida Agriculturist*, discovered a method of hastening the ripening of the Japanese persimmon which may not be known to many fruit-growers. It hastens the long period and the excessive irregularity of the ripening, either on the bush or laid by in the house, so much so that, of a dozen pulled in October, when red, and seemingly on the eve of ripening, some will ripen in a few days, and the last one in from one to two months.

Last autumn his attention was called to the incident that the few earliest ripening had a hole picked into them, until he finally began to smell a rat, but neglected to make a test. Next autumn the same thing was noticed again, till the query came up, Did the hole cause the ripening, or did the ripening cause the hole? He then began a hunt for the proverbial bug, and took the big blade of his pocket knife and ran it to the centre of twenty red persimmons on a tree of forty, about the middle of October. In eight or ten days all the punctured ones were ripe, while the other twenty were still on the tree, red and hard. This incident did not in the least affect the taste or the transportation. The incisions closed up. He had not tried pulling them from the tree before cutting to see how that would affect the ripening. To those who do not know this peculiarity of the persimmon this discovery is of value, as proving that it causes the ripening of them in quantities at once.

THE NEW ENTOMOLOGY.

Among recent visitors to the island (Ceylon) was Mr. George Compere, Entomologist to the State of Western Australia. Mr. Compere is an entomologist of the new school, who has little faith in kerosene emulsion, arsenical insecticides, or fumigation, but believes in making use of the natural enemies of plant pests to destroy them. His theory that every insect has its natural enemy is not a new one, that has yet to be proved, for Mr. Compere has been working for many years on this line, and demonstrates the soundness of his theory over and over again, till it is now a recognised "cult." His name is always associated with that of Mr. Koebele, who did so much to save the fruit

gardens of California, while his work in connection with the "Red Scale" is interesting enough to be referred to, as giving some idea of the boundless enthusiasm of the man. The facts are culled from an official report by the Quarantine Officer of the State Board of Horticulture, U.S.A.

Australia and the adjacent islands had been twice ransacked by Mr. Koebele, and once by Mr. Compere, in the search for an enemy of *Aspidiotus auranti*, but in vain. Mr. Compere was then directed to visit the Orient, and found evidences of internal parasites on the scale at Hongkong; but, discovering that there was no suitable tree to send to California, he ventured into China, in spite of the "Boxer" trouble, and at last came upon a little orange-tree, slightly infested, and observed the small chalcid flies depositing their eggs in the scales. He purchased the tree, carefully dug and boxed it, and shipped to San Francisco. Thus was the Red Scale suppressed in California.

Hailing originally from the latter country, Mr. Compere has for some years been a resident of Perth, Western Australia; but this last statement is hardly accurate, for, while his residence is there, he has been more abroad than at home.

On his previous tour Mr. Compere left Perth in October, 1902, and returned in August, 1903, after visiting Sydney, Manilla, the Philippines, China, Japan, California, the United States, England, Spain, France, and Italy.

Since then, another prolonged tour was undertaken, and Mr. Compere, having come from India, was on his way back to Australia. In Ceylon, where he spent two days, our visitor found much to interest and occupy him in the Government Stock Garden (established in connection with the School Garden scheme), and was able to secure a number of specimens of fruit flies and other insects damaging the crops being raised there. Mr. Compere will, no doubt, make reference to such work as he accomplished in Colombo in his report on his present tour, and we shall look forward to the publication of this report in the pages of our "exchange," the *Journal of the Department of Agriculture, Western Australia*. Mr. Compere's visit was full of interest to us, as he had so much to say regarding the latest developments in his interesting work, which he enters into with a zest and enthusiasm that is not often met with even in a scientific expert, carrying out every detail with his own hand, however unpleasant and trying the circumstances.—*Agricultural Magazine, Colombo*.

RAISING STRAWBERRY PLANTS.

Mr. C. Court, Mooloolah, writes on this subject:—As the planting season is once more approaching, those that have good plants with which to form new beds are fortunate. Many growers pay no attention to this point; but let the plants fruit, when they take runners from already weakened plants to set out new beds. If the old plants have done well and have carried a good crop, they need rest. Would anyone expect a man who has worked hard all day to turn to and work all night? Would this go on long before the man's constitution would be run down? Yet this is what the strawberry is expected to do. Is it any wonder that some varieties are termed run out when treated year after year in this manner? The best way that I know of to keep up their vigour is to plant out a bed of good plants in the winter, 4 feet apart and 3 feet in the rows on rich ground. Keep them well cultivated, and all blooms cut once a week during the spring and summer. They have plenty of room to run without running into each other, so that stout, strong, stocky plants are obtained. If treated in this way, there will be very little chance of them running out. On the other hand, by careful selection they will be improved. The Aurie, although a heavy cropper, has cropped from the beginning of June till the end of December this last year. It is a vigorous grower, but should have fair treatment. Plants treated in this way are, as a rule, cheap plants, because they give good results to the grower.

Tropical Industries.

COTTON CULTIVATION, No. 2.

By A. J. BOYD.

SOWING THE SEED.

In a future paper I shall discuss the question of what varieties of cotton to plant in different parts of the State. The selection of a kind suitable to the soil, climate, and geographical position of the land, and of one which shall produce the best marketable cotton, be it long or short staple, is a very important matter, and deserves a chapter to itself. Meanwhile, I am dealing with the cultivation of the crop.

In the days when cotton seed was plentiful in the State, and was left to rot in heaps as being of no value for commercial purposes, and not even thought of as a valuable manure, the seed was sown thickly in the drills, and when the young plants came up in thousands, the horse or hand hoe was set to work to thin them out into clumps about 3 feet apart. These clumps were again thinned until only three plants were left, and when these had attained a height of about 12 inches the two weakest were withdrawn.

Such a style of sowing cannot be thought of to-day, when good seed is scarce, and its value for the production of oil and cake is everywhere recognised.

Again, cotton was often sown in rows 6 feet apart, with the plants from 3 to 4 feet apart in the rows. Such distances are now deemed excessive, except in the case of the wide-spreading Sea Island varieties, such as the new Caravonica cotton, grown at Cairns, which is planted in rows $7\frac{1}{2}$ feet apart, and the same distance between the plants in the rows. The Uplands cotton, in the Southern and Central portions of the State, succeeds best in rows 4 feet apart, the plants being about 2 feet apart in the rows.

For sowing the seed, farmers in established cotton-growing countries use a special cotton drill. Such implements, although they will, doubtless, be plentiful when cotton is once more a staple product of the State, are, at present, not obtainable here. The grower must, therefore, fall back on the use of a light plough to draw out his drills, these being previously indicated by a marker. The drills should not be deeper than 3 inches, and to ensure uniform growth the depth should not vary. The drills having been drawn, the seed may either be dropped by hand, or more expeditiously by a seed drill, at distances of about 2 feet. The covering may be done with a light harrow. It is essential that the ground *before* sowing be perfectly clean and in fine tilth, and that *after* sowing it be kept perfectly clean, as the growth of the cotton plants will be materially checked if they are smothered with weeds. The amount of seed required per acre is estimated at 1 lb., but practically more than this should be sown to ensure a good even field. At the average distances of rows 4 feet apart and plants 2 feet apart, an acre will contain 5,445 plants, or at distances of 4 feet and $2\frac{1}{2}$ feet respectively the number will be 4,356. For the wide-spreading Sea Island varieties, with 7 feet between the rows and the plants, there will be only 889 plants per acre, but these distances appear to me to be far too great. At Cairns, where this method of planting was adopted, I believe that maize and other crops were grown between the cotton plants. From my own experience, I do not consider it advisable to grow any crop in conjunction with cotton on the same ground, because it prevents the proper cultivation of the principal crop, and the soil becomes exhausted sooner.

In about four or five days after sowing, the young plants will appear, and may be thinned out, if sown thickly, when the third leaf has appeared. When the remaining plants have reached a height of 12 inches, a further thinning will be necessary, only three plants being left, and when these attain to

18 inches two may be withdrawn, the third being now able to hold its own against insect attacks. Cultivation of the usual kind may now be carried on as in the case of maize or any other crop.

The plants will begin to flower in about two months after thinning, and if good fortune has attended the grower in the way of absence of pests in the shape of the boll worm and cotton bug, he will now have reached the most pleasing period of the work connected with the crop—

COTTON-PICKING.

I wish here once for all to dispel the notion which some people still cling to, that black labour is required for getting off the crop. No such labour is needed, nor has it ever been employed in cotton-picking or in cotton-cultivation in the southern portion of Queensland, where almost all the cotton exported has been produced. From first to last cotton is a white man's crop. The average yield of seed cotton is about 1,000 lb. per acre, of which from 300 lb. to 400 lb. will be clean lint and the balance seed. As soon as the bolls begin to open, they should be allowed to fully expose the cotton, which should be full and dry before being picked, but, as soon as it has fully burst out, it should be picked at once, otherwise it will become somewhat discoloured by exposure to sun and dew, to the detriment of future prices. The picking of cotton is a far less laborious work than the picking of strawberries or Cape gooseberries. The picker has scarcely got to stoop, if the plants have been properly grown. With a full crop, a boy or girl will pick from 70 to 100 lb. of cotton a day, the larger quantity as he or she becomes more expert in the work. Experienced pickers can pick with both hands. Under favourable circumstances men have picked 150 lb. in a day. Picking should not be begun until the dew has completely dried off the bolls, so that when we speak about a day's work it means from about 9 or 10 o'clock in the morning till 5 o'clock in the afternoon, with the usual interval of an hour for dinner. When the crop is in full swing, *i.e.*, when the trees are loaded with fully-burst bolls from which the whole of the cotton comes away easily at a light pull of two fingers and the thumb, a family consisting of father, mother, and four sons or daughters will easily pick 600 lb. per day, and, indeed, much more, but I prefer to give the lower figure. Supposing the farmer to have planted 10 acres, he will have 10,000 lb. to pick. I will suppose that only 500 lb. are picked daily; then, theoretically, the whole crop is gathered in by the family in twenty days.

Wet days and the other necessary work upon the farm must, however, be taken into consideration, so that, practically, a longer time would be required, especially as, at the beginning of the season, only a few bolls on each plant would be ready for picking. Given, however, a month, or six weeks even, to gather in the whole crop, it will be seen that 10 acres of cotton can easily be managed by one small family, besides paying attention to other crops.

Where hired labour is required, it is customary to pay the pickers by the lb. The usual price paid at a time when cotton was bringing from 9d. to 1s. 6d. per lb. in the home markets, and the farmers were paid from 2d. to 3d. per lb. for their seed cotton, was $\frac{1}{2}$ d. per lb., and at this price boys and girls were able to earn from 2s. 6d. to 4s. per day, and men and women as much as from 5s. to 7s. per day. To enable the young people to earn money at cotton-picking, it has been found necessary either to alter the holidays or to allow the children to attend school for half a day only before noon, giving them their holidays during the cotton-picking season instead of at the usual period of mid-summer or mid-winter. By this plan, they lost very little school time, but brought a substantial addition to the family income.

When the cotton is picked, it should be spread out in the sun on tarpaulins or stretchers to dry thoroughly and harden the seed. This is effected in a few hours, after which it is packed in bags or bales and sent to the nearest ginning establishment, or is sold to the merchants in the seed.

Now, how much can a farmer realise from 10 acres of cotton by selling his crop at 2d. per lb.?

Cost of Producing an Acre of Cotton.

	s.	d.		s.	d.
Ploughing	7	0	Cultivating	4	0
Harrowing	1	0	Bale	2	6
Seed	5	0	Marketing	4	0
Planting seed	1	2			
				£1	4 8
			Picking 1,000 lb. @		
			½d. per lb.	2	1 8
				£3	6 4

Return of an Acre of Cotton.

	£	s.	d.
1,000 lb. at 2d. per lb.	8	6	8
Cost of production from sowing to market	3	6	4
(Including hired labour for picking at ½d. per lb.)			
Balance to credit	£5	0	4

On the basis of this calculation 10 acres would bring in a net return, clear of all expenses, of £50 3s. 4d. The bale, being only a first charge, should not be reckoned in the expenses, as it will serve for several seasons if properly cared for.

If he keeps the cost of picking in his own family, he saves a cash outlay of £2 1s. 8d. per acre, or on the 10 acres £20 16s. 8d., so that his actual net cash return amounts to £71 or £7 2s. per acre. How does this compare with maize-growing? A 40-bushel crop at 2s. 3d. per bushel gives a net profit of £2 18s. 4d. per acre. Of all our ordinary farm crops, rice is the only one which can compete in value with cotton. An acre of rice producing 30 bushels is worth £6 for grain and the same for straw. It costs £3 3s. 9d. to produce an acre of rice, the net profit being £8 16s. 3d. The net profit on wheat on the same basis, and including straw, is £2 16s. 1d., when wheat is selling at 3s. per bushel. On barley it is £3 1s. 1d., and on maize with a 30-bushel crop £2 2s. 11d. And over all these cotton presents the additional advantage of less labour in harvesting.

Can the farmer afford to sell his seed cotton at 1½d. per lb.?

Undoubtedly, a 1,000-lb. crop at 1½d. would pay him better than the above-mentioned crops. Picking being confined to his own family, his expenses are only £1 4s. 8d. per acre, and his return £6 5s., leaving a credit balance of £5 0s. 4d. It may happen that the grower decides on having his cotton ginned. In this case he will pay £1 0s. 10d. per 1,000 lb. for ginning at ¼d. per lb., but he gets back the seed as well as the lint: 600 lb. of seed at £4 10s. per ton is worth £1 4s. 1d., or 3s. 3d. more than the cost of ginning. In the United States, the ginning establishments will clean the farmer's cotton, taking the seed in payment. How does ginning affect the returns per acre?

	£	s.	d.
Expenses, including picking	3	6	4
Ginning	1	0	10
	£4	7	2
400 lb. lint at 6d. per lb.	10	0	0
600 lb. seed at £4 10s. per ton	1	4	1
	£11	4	1

In this case, the net profit is £6 16s. 11d. as against £5 0s. 4d. if the cotton is sold in the seed, a difference in the farmer's favour of £1 16s. 7d. per acre. It should be noted, however, that the very best only of Uplands cotton will produce 400 lb. of clean lint from a 1,000-lb. crop. To ensure this result the staple must be of good length, the seeds small, few, and easily detachable from the lint, the bolls all well filled, and the crop a full one. Under ordinary circumstances the grower may reckon on 300 lb. of lint per 1,000 lb. of seed cotton, and 700 lb. of seed worth £1 8s. 1½d., totalling £8 18s. 1½d., against which his expenses are £4 7s. 2d., leaving a credit balance of £4 10s. 11½d., or 9s. 4½d. less per acre than if he had sold it in the seed.

The question of freights, commissions, &c., must come in in any calculation connected with the export and sale of ginned cotton. That I shall discuss later on.

THE BEST VARIETIES TO PLANT.

Whatever variety of cotton we plant, certain qualities must be looked for if we are to produce an article which will command a high price in the world's markets. The main qualities are—length of staple, quantity of lint per acre, silkiness of texture, uniformity in length, together with strength and lustre of staple.

The Sea Island cotton possesses all these, but it is more suitable for planting in the northern portion of the State than in the southern, especially when quantity as well as quality is looked for. Allowing that this variety, as also that evolved last year by Dr. Thomatis—the Caravonica—is admirably suitable for the northern planter, let us consider what variety, combining all the good points mentioned, is most adapted for Southern or Central District cultivation. Here it can only be a question of Uplands cotton. There are several varieties of this which have been grown experimentally by the Brisbane Acclimatisation Society, and, although grown under somewhat adverse circumstances, have nevertheless shown that the cotton possesses most desirable qualities, and that some kinds can resist dry conditions of climate to an extraordinary degree. Amongst these are—

	Value per lb.
Egyptian Mitaifi	7½d.
Truitt's Big Boll	7½d.
Lewis's Pride	5½d.
Eldorado	6d.
Sea Island	1s.
Caravonica	8½d.

Amongst American varieties Duncan's Mammoth Prolific is highly spoken of as a prolific bearer and very drought-resisting. The fibre is creamy-white, and the seed is easily detached. The bolls are very large.

Another Mammoth Prolific has been favourably noticed by the United States Department of Agriculture. In Texas it is considered the most productive of any yet planted in that State. It is easily ginned, easily picked, and has a remarkably long staple.

Dickson's Prolific is said to be a quick grower, very fruitful, and the lint is fine and strong.

Peterkin is a favourite in South Carolina; it is not only highly productive, but produces more lint from a given quantity of seed cotton than any other which competed with it. The lint is of excellent quality. The plant itself withstands drought. The bolls are very large, and as they open widely the crop is easily picked.

Jones's Improved is a long-stapled cotton, very fine, and pure white. It bears profusely.

As compared with the ordinary Uplands varieties, these have been proved to be far superior. Experiments made at the Agricultural Department of the

University of South Carolina with several varieties of Uplands cotton, including the above, gave the following results:—

			Seed Cotton per Acre.	Lint per Acre.
Jones's Improved	...	...	1,940 lb.	582 lb.
Dickson's Prolific	...	...	1,880 „	564 „
Peterkin's Cottonseed	...	...	1,880 „	667 „
Ordinary Uplands	...	...	1,620 „	486 „

It does not follow as a matter of course that because these particular varieties have been shown to be such heavy bearers on an experiment farm that they would be equally prolific when grown in quantity as a field crop in another country and under possibly different climatic conditions. Still, if Queensland is to take rank as a cotton producer and exporter, it behoves intending growers to see that they obtain the best varieties, and this object can be gained by the aid of the Agricultural Department, which is ever on the alert to help the farmers in the introduction of new varieties of seeds and plants, as was done in the case of wheat, and, later, of new varieties of American maize. The Acclimatisation Society, also, may be relied upon to do their share of introducing and acclimatising the best varieties of cotton, and there is no reason why the farmers themselves should not put their own shoulders to the wheel, and, by selecting the finest and best of their crop, raise good varieties for themselves.

I have said nothing as yet about treating the cotton plants after the crop has been gathered. It used to be the custom to plough out the old plants and sow afresh every year, although many farmers, instead of doing this, pruned the bushes as is done with grape vines. Pruned cotton comes earlier into bearing in the following season than that which is raised from seed. The plants also become sturdier with age, and better able to resist storm, drought, and disease. When it is intended to prune the plants, the rows must be further apart than when they are to be ploughed out and the field sown afresh. Whilst pruning has its advantages, it also has the disadvantage of demanding increased expense. Still, both plans have their advocates, and rather than advise on the matter we will leave growers to find out for themselves what suits them best. *Experientia docet.*

Reverting to the question of what seed to sow. What is known as "Long-stapled Uplands" is now largely produced in the United States, Mississippi, and other favoured districts. Although it cannot rival the Sea Island in quality, the quantity produced there is quite equal to it. The chief varieties grown are Allen and Peeler, but these names have become almost generic, and refer to that class of Uplands possessing a staple of $1\frac{1}{2}$ inches or more. Some of them are crosses between Sea Island and Uplands, while others have been obtained, it is supposed, by selection from ordinary Uplands. The United States Department of Agriculture has for some years been experimenting with Egyptian cottons, and the seed has been grown with varying success in different parts of the country. As far as the general result of such trials is concerned, it is doubtful whether, up to the present, a great measure of success has been obtained. As a rule, it may be said that Egyptian cottons grown in the States have given a poor yield, the cottons are later in coming to maturity, while they are very strong in growth. They seem to keep their lustre to a certain extent, but lose their fineness. The well-known colour of the Egyptian cottons to a very great extent disappears when grown in the United States. As far as length of staple is concerned, the Department, by a process of selection, has actually increased the length of the Egyptian fibre. Seeds taken from the Ashmouni cotton and sown, with subsequent selection, resulted in the production of a fibre longer than the original, and the same result has been attained with seeds of another variety imported three years ago. Again, numerous experiments are being made by crossing Egyptian cotton with both Sea Island and ordinary cotton. The produce shows a marked increase in size of bolls over either parent. The most hopeful obtained up to the present seems

to be a cross between Ashmouni cotton and American varieties. One of the most striking results of selection is now seen as regards

IMMUNITY FROM PLANT DISEASES.

Some years ago, the wilt disease attacked the Sea Island cotton to such an extent that whole fields were destroyed, and the growth of cotton on them was threatened with ruin. It was observed, however, that a plant here and there resisted. Seeds were selected from these and planted side by side with ordinary unselected seed on infected land. The plants from the former proved quite resistant, while those from unselected seed were destroyed. It is thus seen how the process of selection may be brought into the ordinary routine of agricultural work, and it behoves every cultivator to impress upon his mind the importance and necessity of adopting a process of selection, aided by improved methods of cultivation.

In our own State, Dr. Thomatis, of Cairns, has, by crossing a long-stapled variety of the best cotton grown in Mexico with the Sea Island cotton of Peru, succeeded in producing a new variety of cotton, which he has called "Caravonica" cotton. The Mexican variety (a true *Barbadense Gossypium*) was chosen for length and fineness and gloss, and the Amazonian for length and strength. The experts of the British Cotton-growing Association have pronounced this cotton to be of long, strong, and regular staple, rather lacking in fineness, and of all the cottons collected by the association the Caravonica was adjudged the most valuable, surpassing even a special variety crossed by the eminent Sir Daniel Morris, C.M.G., British High Commissioner for Agriculture in the West Indies. The Caravonica cotton can be sold in any quantity in the home markets at 9d. per lb. This cotton grows to a great size, the trees are very prolific, the bolls large (70 to the lb.), of which 28½ per cent. is clean lint and 71½ per cent. seeds, which are black and perfectly clear of floss. It is stated by Dr. Thomatis that one acre will produce half a ton of ginned cotton, and that gentleman reckons on a gross income from his crop of about £40 per acre and a net return of about £30 per acre. The seed has been readily selling in this State at 10s. per lb. It is doubtful whether the Caravonica is suitable for the Southern districts, but this will be proved during the coming season, as the Department of Agriculture has distributed some of the seed to farmers in suitable localities and to the Experiment Farms.

COTTON—AN AUSTRALIAN INDUSTRY.

In a series of well-written articles now running through *The People's Daily*, a journal published in Melbourne, the writer is placing before the people of the States of the Commonwealth all the information which can be gathered from reliable sources connected with the cotton-growing industry. In the issue of 29th January is published a portion of the Market Report of Messrs. Mailler and Tuersan, of New York, which reads as follows:—

COTTON.—It is impossible to report conditions with any degree of reliability. Speculation is still active, and on an enormous scale, which has recently advanced prices to over 13 cents (6½d.) per lb. for prompt delivery, the highest figure known for the past twenty years. Many manufacturers naturally hesitate at paying these extreme figures, and many of the mills are closing or running on short time. Since the above was written, news was cabled on the 28th January that cotton had advanced in England to 8d. per lb. spot cash—the highest price known for thirty years. The journal quoted says:—In a previous article we showed that Queensland cotton paid handsomely at 5½d. per lb. Well, 9d. (in allusion to the price said to have been offered to Dr. Thomatis, of Cairns, for his Caravonica cotton) means nearly 100 per cent. advance on that price, and, in our first article, we predicted that very shortly a present penny-worth of cotton might reasonably be expected to become worth 1s., so that prognostication is already well on its way towards realisation.

COTTON IN THE CENTRAL DISTRICT.

When writing in March, 1903, on the subject of cotton-growing in the West, we instanced some cotton grown by Mr. Hannay, at Barcaldine (358 miles west of Rockhampton). This cotton, of the Sea Island variety, had been growing for four years unaffected by the great drought. The plants, which have been allowed to grow to a height of 8 or 10 feet (see illustration in Vol. XII., p. 164), produced a profusion of large bolls, and we valued the cotton at that time at from 8d. to 1s. per lb.

Early in February of this year, Mr. R. J. Jones, of Orange Grove Farm, at Alpha (273 miles west of Rockhampton), wrote to the *Brisbane Courier*, stating that he had 300 cotton bushes then laden with bolls and flowers so heavily that the branches broke down with the weight of the bolls. He was so satisfied with the result of his experiment that he intends to put in 18 acres of cotton during the coming season.

Another farmer at Bogantungan (228 miles west of Rockhampton) sowed some cotton seeds in September and October, 1903. These did remarkably well, the plants in January being between 3 and 4 feet in height, and covered with bolls, promising a large yield of lint. A large area will probably be sown with cotton this year.

It is from experiments such as these that farmers can learn whether a cotton crop will pay them or not. We have repeatedly stated that cotton-growing will pay well, at prices much below those now ruling for the staple. But large plantations, we feel assured, will not pay in Queensland. Neither would it be wise to do as the small sugar-planters do, *i.e.*, put the whole of the land under sugar and little else, but small crops for horse and cattle feed. If farmers in the cotton belt, working from 25 to 100 acres of arable land, would devote one-tenth of that land to cotton, it would not interfere with their usual crops, and would prove a good stand-by in dry weather, when many other crops fail. Those who intend to put in a crop next season will do well to see about getting seed in time. As the seed will have to be imported from the United States or Egypt, some months must elapse between the sending of an order and the arrival of the seed in Queensland.

As to the quantity of seed required, in 1 lb. of cotton seed there are from 3,800 to 4,000 seeds. At the distances of 4 feet between the rows and 2 feet between the plants in the rows, there would be about 4,000 plants to the acre. Theoretically, then, 1 lb. of seed would suffice for 1 acre. But it is advisable to sow at least 3 seeds in every hole (some sow 6), therefore, the quantity required would be between 3 and 4 lb. But, as some of the seed may be damaged and infertile, it is safer to allow 6 lb. of seed per acre, when buying.

COTTON AT BARCALTINE.

In the early part of 1903 we paid a visit to Mr. Hannay's farm at Geera, close to Barcaldine. There we saw several cotton bushes or trees rather, which were about four years old, and had neither been cultivated nor irrigated during all the long drought. We examined the cotton, and expressed the opinion that it would be worth from 8d. to 1s. per lb. in the Liverpool market.

A report has just been received by Mr. Hannay from Messrs. Prescott and Co., cotton brokers, of Liverpool, on a sample of this cotton which was sent to them. The report states that it is an excellent style of cotton, superior to anything grown in America, except the Sea Island cotton on the coast. It is longer in the staple, stronger, and of good colour, and would command a higher price than any other in the market.

This report, combined with those from farmers at Alpha and Bogantungan, clearly settles the question as to whether good cotton can be grown on the western central plains.

THE COTTON WORM.

Should cotton-growing once more become, as we believe it will, one of the settled industries of Queensland, it is probable that, owing to the long time which has elapsed since cotton was grown in the Southern portion of the State, the plant and bolls may for a time be free from the pests of which growers in the past had unpleasant experience. But, in the nature of things, the pests attendant on a cotton crop will not long delay to put in an appearance, and therefore we should be prepared to combat them, assisted by what we learn from other cotton-growing countries. In a late issue of the *Agricultural News*, of Barbados, the use of Paris green, as a dry mixture, with finely-sifted, dry, air-slaked lime was recommended as a remedy against the cotton worm. The *News* now writes:—

The dry mixture has been the more strongly advocated because it requires no expensive apparatus for its application and because there are so few spraying outfits in these islands. While the cotton worm occurred only sparingly, as was the case at the beginning of the season, 1 lb. of Paris green in 50 to 100 lb. of dry lime seemed to be sufficient; but now that every field attacked soon comes to have enormous numbers of caterpillars, this mixture is found to be too dilute.

Recent trials of a mixture at the rate of 1 to 10 seem to give good results; while the Honourable F. Watts and Mr. W. N. Sands write that in Antigua the mixture is most successfully used at the rate of 1 to 6.

The amount necessary per acre varies, of course, according to the size of the plants, but in Antigua 1 lb. of Paris green has been found to serve for one application for $\frac{1}{2}$ to 1 acre. An experiment, conducted at the Botanic Station, Barbados, has indicated that, mixed in the proportion of 1 to 10, a lb. of Paris green will be sufficient to dust $\frac{1}{3}$ to $\frac{1}{2}$ acre.

Used as a spray, Paris green has been recommended in a mixture at the rate of 1 lb. to 150 gallons of water with two or three times its own weight of lime. This mixture may be made stronger—1 lb. to 100 gallons of water—if a proportionate increase in the amount of lime is made. In preparing a Paris green mixture for spraying, the poison should first be mixed with a small quantity of water and then added to the full amount, otherwise there is a possibility of its not getting thoroughly mixed.

The same journal has an article in its November issue, 1903, on—

COMBATING THE COTTON WORM BY MEANS OF PARASITES.

Among insects, as among all other groups of animals and plants, there is constantly going on a keen struggle for existence. Insects are preyed upon by animals in other orders—such as birds, toads, and lizards—and by other insects, examples of which are very easy to find. The wild bees eat caterpillars; the dragon-flies or pond-flies capture and devour butterflies, grasshoppers and even other dragon-flies; lady-birds (Coccinellids) eat plant lice and scale insects. Many more examples might be given. In addition to these predaceous insects, there are others still more common and much more effective in checking extreme outbreaks of insect pests. These are parasites, and they are extremely abundant.

Parasites are of two kinds—external and internal. Examples of the former are the very familiar reddish mites found attached to the body and wings of grasshoppers. These act in a similar way to those parasites of the higher animals—the lice and ticks of man, cattle, dogs, fowls, &c. In the insect realm internal parasites are of much more importance than external. These have a wide range in habit, structure, and relationship, but the commonest are certain two-winged flies (Diptera), and certain of the wasp-like, four-winged flies (Hymenoptera). Insects of nearly all orders are attacked by internal parasites, and the attack usually results in the destruction of the individual attacked, or the host, as it is called.

Two of these internal parasites have recently been reared from pupae of the cotton worm by the Entomologist on the staff of the Imperial Department

of Agriculture. A large number of pupae was kept in boxes and jars under favourable conditions for the moth to emerge. After eight days no more moths emerged, but on the ninth and subsequent days a number of small flies appeared and a few small black and white Hymenoptera. Although at present nothing is known of the early stages of these insects, yet it is possible, from our knowledge of other similar insects, to give a general account of the life-history of each.

This parasitic fly is at first glance not unlike the common house-fly, but comparison shows it to have more bright colours on the head, and the body is covered with rather long, stiff hairs. It belongs to the family Tachinidae or Tachinid flies, nearly all of which are parasitic.

The adult female has no sting or ovipositor, so that when the eggs are laid they are merely fastened upon the skin of the caterpillar which is attacked. If the caterpillar sheds its skin at once, the egg may be cast off with it, but it generally happens that the egg hatches before the moulting of the skin takes place. In this case the small, white, footless maggot, which comes out of the egg, immediately bores its way through the skin of the caterpillar, which is now the host, furnishing both food and protection to the unwelcome guest. Here this small maggot lives and grows, feeding on the vital fluids of the host. In spite of this tax upon it the caterpillar is able to go on to the pupa stage; but when this is reached and no more food is being taken in to supply the demands of the maggot, the guest eats up the host itself. All the concentrated energy and dormant life, which should go to develop a moth capable of reproducing its kind, is converted into a fly, whose object in life is to live at the expense of some other insect, and so instead of a moth there emerges from the cocoon a fly. The hymenopterous parasite differs from the fly in the method of depositing its eggs. This one has a sting-like ovipositor, by means of which it is able to insert its eggs under the skin of the caterpillar, and then there is no escape for the unlucky host.

At present the cotton-worm parasites are very few in proportion to the extreme abundance of the host, but later the proportion of parasites to host will be much higher.

Insects in their native localities and under normal conditions are less likely to become epidemic than if they are introduced to new localities or if the conditions become considerably changed. This is because the relation of host to parasite is upset, the parasites having to accustom themselves to the new host, or the host having opportunities for rapid development which enable it to increase to a remarkable extent in spite of its parasites.

Extreme abundance of any insect pest is usually followed by a season of comparative scarcity, which is due to the development and increase in number of the parasites consequent upon the extreme abundance of its host or food supply. Later, other parasites may be bred from the eggs or the adult, and experiments will be tried by this Department as to ways for increasing the numbers of the parasites already known.

USES OF COTTON SEED.

Among the industries of America, and particularly of Texas, one which is gaining rapidly in importance and assuming large proportions as an export business, is the manufacture and handling of cotton-seed products. It is estimated that the value of this product as a revenue-maker is not less than 1,000,000 dollars annually, although up to about twenty years ago the seed was used as a fertiliser, and almost thrown away. Now it is made into a number of edible articles, and yet only 54 per cent. of the seed produced in this country is utilised because of the lack of mills. It is estimated that as many as 100 new mills are being erected each year in the cotton-growing States, and that the annual output of oil is increasing at the rate of about

100,000 barrels. The cotton gins and oil mills are all in the cotton fields in the near-by markets.

The process of removing the oil from the seed is simple. The short lint left by the gin is first removed, a process called delinting, and is about the same method as is employed in the ordinary gins. Next the seed is passed through a huller, which presses the meat out of the hull, and the separation of meat and hulls is effected, leaving what is called decorticated cake.

The cake is pressed between a series of some five rollers, back and forth, in order to crush thoroughly the oil cells and prepare for the easy extracting of the oil. In this condition the meal is put into large kettles with revolving arms, and subjected to a heating process called cooking, and from the kettles is put into a former, which shapes it into flat thin cakes suitable for pressing. The cakes are laid one above the other in presses, and subjected to a pressure of some 5,000 lb. to the square inch, and the oil is squeezed out, leaving a hard, dry cake.

The oil runs out a black liquid, and is stored in tanks, and the cake is either ground into meal or sold after packing in Dundee bags for export. Some of the cake is merely cracked or broken into small pieces, and used for feeding cattle and sheep on the ranges in this country.

In cooking the meal a temperature of from 135 degrees to 162 degrees is used, and, for pressing, the meal is wrapped in horsehair bags or strips. The content of oil in the decorticated cake is from 20 to 25 per cent., and the amount expressed is from 15 to 20 per cent., so that something like 30 per cent. of the oil remains in the meal. The crude oil, reddish-brown to black, is allowed to settle until a slimy precipitate has deposited, when it is agitated with caustic alkali solution, as one of the methods, and again allowed to settle. The sediment is what is known as stock, and is used as its name suggests. If the oil is clarified with Fuller's earth and chilled below 21 degrees, the palmitin and stearin crystallise, and are removed by cold pressing. This solid fat is called cotton-seed stearin, and is used in making oleomargarine.

Refined oil has a pale straw color, and possess a bland, nut-like taste, without odour. It has a slight tendency to dry, and is used as a substitute for olive oil in cooking, as a constituent for margarine, for compounds of lard, soap-making, and to some extent as an adulterant for the more expensive oils. Oil made from poor seed is possessed of a bad odour.

In the refining process it is estimated that the oil loses about 11 per cent. of its volume. This will leave the product of the year, just about closed, at something like 2,000,000 barrels, worth, on average, say 20 dollars a barrel. Eighty-five per cent. of the season's crop was prime oil.—*Texas Truck Farmer*.

GERMAN TEXTILE PROGRESS.

In view of the great demand for raw cotton, and of the shortness of the supply, prices have risen considerably, and although inferior kinds of cotton have not risen in the same proportion as the better varieties, the former have yet been able to attain a rise of at least 10. per cent. over last year's quotations. It seems that Germany, which has been carefully following the experiments in cotton-growing which British colonists in West Africa have been making, and, as a result, energetic measures are being taken by our German kinsmen in that country to enter upon the cultivation of cotton on a large scale. The *Times Weekly Edition* says:—

The growing importance of the German textile industry, and especially of the cotton trade, naturally demands the development of sources of raw material which shall be independent of commercial and political relations with other countries. The experiments in cotton-growing, which have for some time past been made on the West Coast of Africa under British auspices, have been followed with the closest attention by the German colonial authorities in Africa. For the systematic organisation of the work in German East Africa an official

cotton inspector has been appointed who is a cotton farmer of wide experience from the North American cotton States. The inspector's headquarters will be at Dar es Salaam, and his duties will be to see that the cultivation of the cotton is conducted in a manner which may lead to ultimate success, and to survey the sites of new plantations, in the choice of which proximity to rivers and to contemplated railways is to be a paramount consideration. This year's harvest in the coast regions of German East Africa is estimated at 50,000 German pounds weight. Fresh plantations have been laid out in the following districts—in Dar es Salaam about 600 acres, in Bagamoyo about 240 acres, in Kilwa about 220 acres, and in Mohorro about 50 acres. The cotton which has lately been received from the Lindi and Tanga districts is valued at between 70 and 80 marks (or shillings) per 100 German pounds (50 kilogrammes, or 110 lb.)—that is, nearly 9d. per lb. This crop is said to be equal to the best "White Egyptian" and to be suitable for the finer-spun yarns as well as for worsted. In Togoland a cotton inspectorate has also been created, with its office at Lome, and in this district the cultivation of cotton by natives is making rapid progress. According to latest advices the crop from the Togo Hinterland is expected to reach several hundred bales. It is noteworthy that the samples of the new Togo crop which have arrived are rated as being superior to the first crop, and are classed as "fully good middling." The English cotton expert from the Gold Coast is said to have expressed a very favourable opinion of the progress made by cotton-growing in Togoland, and to have observed that the end of June or the beginning of July was also the time for planting the cotton in the Gold Coast Colony.

The undeveloped condition of the country naturally renders the question of transport one of the utmost importance. The solution of this difficult question is being promoted on the one hand by the establishment of an inoculating station, in charge of an army staff surgeon, to combat the dreaded "tsetse" fly, and on the other hand by surveys for the new railway line from Kilwa to Lake Nyassa. The construction of the projected railway from Lome to Palime will be entrusted by the Government to a firm of contractors, and upon its completion the new line will be transferred, together with the wharves and coast railways, to a company, under special condition safeguarding the interests of the colony. In German South-West Africa the prospects of cotton cultivation are also favourable. Several large samples of cotton grown from the famous Sea Island seed are declared by experts to be of extremely good quality. The farmers are proposing to form an association for damming the Swakop River, in order to utilise its waters for the development of cotton-growing. It is further proposed to canalise the river Kunene in the north in order to prepare the soil for cotton culture in that part of the colony.

The German textile industry and the various chambers of commerce are rivalling each other in their support of this new enterprise which is being so extensively developed throughout the German sphere of influence in Africa. Attention in Germany has been drawn to the fact that the British Cotton-growing Association intends to raise its capital from £50,000 to £100,000. Moreover, it is noted that the expenses of the cotton experts in the employ of the association are borne by the individual colonies in which they are engaged. Belgium also is said to be on the point of introducing the cultivation of cotton into the Congo State, while the excellence of the cotton grown in Cuba, and the still greater possibilities of the island in this respect, have already attracted German attention to this new rival. The object of the colonial scholarships of the Berlin Society for the development of colonial agriculture, which I mentioned in my despatch of 17th November, is to qualify young German farmers to become cotton inspectors in the German colonies by a twenty-one months' course of study in the cotton States of America. This step is said to be due to the initiative of the German consul at the great cotton port of Galveston, under whose supervision the new students will be placed.

TOBACCO NOTES.

By R. S. NEVILL.

EDWARDS, GOODWIN, AND CO.'S ANNUAL TOBACCO REPORT.

27 Gradwell street,

Liverpool, 31st December, 1903.

Stocks—31st December, 1903 ... 113,264 hogsheads

" " 1902 ... 121,431 "

Delivered for consumption—

1903 ... 58,697 hogsheads

1902 ... 54,493 "

Prices.

STRIPS.	1903.	1902.	LEAF.	1903.	1902.
WESTERN—			WESTERN—		
Fillers ...	— @ 4½ @ 5	— @ 5	Common export ...	— @ —	— @ —
Rather short ...	5½ @ 5½	5½ @ 5½	African export ...	4½ @ 5 @ 6	— @ 5 @ 6½
Very middling to middling	5½ " 6½	6 " 6½	Short trade ...	— @ 4	— @ 4
Good to fine ...	6½ @ 7 @ —	7 " 8	Medium to good trade	4½ @ 5½	4½ @ 6
BURLEY ...	5 " 7 " 8½	5½ @ 8 @ —	BURLEY ...	6 @ 7 @ 8	6 @ 7 @ 8
VIRGINIA DARK—			VIRGINIA DARK—		
Fillers ...	4½ @ 5½	— " 5½ " 6	Common export ...	— @ —	— @ —
Rather short ...	5½ " 6	6 " 6½	Short trade ...	4 " 4½	— " —
Very middling to middling	6½ " 7	6½ " 7½	Medium trade ...	4½ " 5	½ " 5
Good to fine ...	7½ " 8½	8 " 10	Good to fine trade ...	5½ " —	5½ " —
VIRGINIA and CAROLINA			VIRGINIA and CAROLINA		
BRIGHT—			BRIGHT—		
Semi-dark ...	— " 5½	— " 7½	Common or semi-bright	— @ 5 @ 6	— @ 8
Semi-bright ...	6 " 7½	8½ @ 9 @ —	Medium or mixed ...	7 @ 8	8½ @ 10 @ —
Medium or mixed	7½ " 9	10 @ 11	Good to fine ...	9 @ 10 @ 13	11 " 12 " 15
Good to fine ...	10 " 12	11½ @ 12½ @ 14			

The year 1903 has been an uneventful one on the whole, buyers as a rule operating only for the normal demands of their trade, and prices showing a drooping tendency until near the close, when a firmer feeling prevailed.

JAMES CURTIS AND CO., LONDON,

Quote—Cigar tobaccos, 7d. to 5s. per lb.

The Agricultural Department of Victoria have carried out a series of experiments with blue mould, including elevated beds, and beds on hills, and the use of fungicides; but failed to prevent the disease. Their experiments have been almost identical with our experiments at State Farm, Texas, with like results.

A tobacco-grower of Connecticut has adopted the plan of covering the floor of his tobacco shed with sand, and thinks it tends to prevent pole sweat and mould.

Recently the Breslau Chamber of Commerce passed resolutions in condemnation of the American methods, which threaten to control the tobacco trade of that country. The resolutions seem to be aimed at the American Tobacco Company, while, if reports given out at the settlement of the English fight were true, the British-American Tobacco Company is responsible for the activity at present evident in Germany. Protests are being sent to the Government requesting assistance in repelling the invader.

Mr. P. J. Janssen, who was a citizen of Holland, although he was born in Hanover, Germany, was the original founder of the Deli Maatschappij, the oldest and most famous of the tobacco-growing corporations of Sumatra.

The company was founded on 1st November, 1869, with Mr. Janssen as general manager. At that time it was not suspected that the industry of growing tobacco in Sumatra would assume such large proportions, nor that the tobacco would become such a necessary adjunct to modern cigar-making. The original corporation was capitalised at only 120,000 dollars. After twenty-five

years of business the capital had increased to 1,600,000 dollars, on which the average yearly dividend was 63 per cent. This increase of capital was made from the earnings of the company over and above the average yearly dividends of 63 per cent. They grow only cigar tobacco.

A Bill has been introduced into the United States Congress, asking that farmers be allowed to manufacture and sell their own growing, without license or tax. Monster petitions are being sent by growers, asking Congress to pass the Bill. Representative Trimble, of Kentucky, author of the Bill, says its object is to prevent the larger buyers from arbitrarily fixing prices for the leaf or manufactured product.

Area of tobacco planted in United States in the year 1903, 1,037,735 acres, producing 815,972,425 lb., valued at 55,514,627 dollars.

NOTE ON A COMMON FIBRE PLANT.

A correspondent, writing to us (*Agricultural Magazine*, Ceylon) on a matter of business, asks if sufficient encouragement is being given by the local authorities for developing the indigenous resources of the island. He says that enough is not being done to make the most of what already exists, and too much attention is given to what is new and foreign. He instances the case of fibres, and asks why attempts are not made to encourage the cultivation of fibre plants already found growing in the island.

We quite agree with our correspondent that much more might be done in the way of growing such plants as *Crotalaria Juncea*, the Sunn Hemp of India and Hana of Ceylon. The fibres are used to a fairly large extent in the manufacture of fishing nets, and for this purpose it is cultivated in parts of the island, as, for instance, the Chilaw district. We have little doubt that the plant would be more largely cultivated if the people were made aware of the fact that there is more than a local demand for the fibre.

Not long ago the Burman Government sent a 2 lb. sample of the fibre to the Imperial Institute, with a request that the report on the fibre might include its value in the London market, together with any remarks that could be given as to how the quality of the fibre could be improved.

Mr. Collyer, the fibre expert, stated that the fibre should sell freely in the London market, and that its cultivation should be encouraged as much as possible. In his opinion the sample was strong, bold, and clean, though of a somewhat dull colour, its length varying from 36 to 40 inches. He fixed the value of the fibre as represented by the sample sent £16 to £17 per ton, but advised that it should be better cleaned than the sample, and should also be brighter in colour; and added that, if more carefully prepared, its value would be from £2 to £3 per ton higher than the price quoted.

Messrs. Puddy and Co., confirmed, by independent reference, the statements of Mr. Collyer. They find the fibre to be of fair quality, and state that it might be brighter and longer with advantage; but that it is saleable in the London market, and that if they had at the present time a shipment on hand they could secure £16 to £16 10s. per ton for it.

The late Sir Frederick Abel had the fibre examined in detail by the comparative process adopted in the Research Department of the Institute, and this examination went to confirm the opinion expressed by the practical experts in regard to the good quality of this fibre.

[Many years ago, when engaged in farming pursuits, we received from an Indian indigo-planter at Oxley Creek (Mr. Robert Reid) a packet of jute seed and one of what he called "Sunn Pât." Both grew to perfection. The jute ran up to 8 feet in height, and the Sunn hemp to about 5 feet. In those days there was no Agricultural Department to assist the farmer to a market, so we cleaned the hemp and used it for tying up plants. An old bushman in our employ made a fishing line out of both kinds, and its strength was something remarkable.—Ed. *Q.A.J.*]

Science.

TECHNICAL EDUCATION.

By DR. W. MAXWELL.

I should like to say, in the first place, that this address is intended somewhat more directly for a small minority of men whose ambitions may be along the higher lines of technical study and attainment. In this matter, as in others, instruction may be primary, or advanced, or ultimate and complete. In the more advanced forms of a general school education, the elements of the sciences could be taught with high advantage as subjects of the natural knowledge that should be a part of the general mental outfit which all youths should have in stepping out into life. Again, some tuition and practice in the common mechanical arts, such as mechanical drawing, carpentry, and similar things, can be of very special help to those greater numbers who will have to follow everyday vocations. In the school systems of Germany, Switzerland, and of some other countries, the natural knowledge or primary tuition in the sciences of which we have spoken, occupies a definitely adjusted place, while the more practical exercise in elementary mechanical things is provided for in their "Industrial Schools." These primary kinds of instruction, however, do not in any sense reach up to or come within the systems of modern technical education which are followed by students at the great technical institutions, such as are found at Boston, Zürich, and Berlin. Elementary natural knowledge should be a part of common education, as arithmetic is a part of it; and common training in mechanical practice should be for all who have to exercise the common arts of life. But technical education must always be for the relative few who are to become the directors of existing and the discoverers of future technical processes that are to govern the great industrial undertakings of modern times. And this technical education for the few should include all that was known in the past and that is practised to-day. It must consist in an all-covering knowledge of the laws and of the practice of technology as it is comprehended at this time. And, for the material advantage and progress of a country along those lines of business and commerce that are controlled by modern technical process, it were better that five of its rising citizens should be educated and trained thus profoundly than that 5,000 should be furnished with a measure of such knowledge that is too indefinite and small to be put into actual business and use.

HISTORICAL.

To-day, when modern knowledge has such an undoubted claim to speak of its beneficent achievements, nothing is more required by the investigator and the critic than the temper of calm and historic survey, which enables them to determine what is old and what is new, and to bring into comparison the performances of the present with the attainments of the past, and to give to them their relative measures and awards.

When we seriously appreciate the antiquity and the necessities of the human kind, it then becomes apparent that a knowledge of natural things, and probably of the technical arts, must be, almost of necessity, very old; and, as far as we are able to judge from the accounts, it is very old. What really appeals to the surprise of the student in this matter is, not the probability of the existence of knowledge in earlier ages, or its fulness at this time, but rather the eclipses and the ups and downs that human attainment has undergone along the line of progression from its beginning to the present day. Unwritten pages repeatedly occur during the history of mankind when waves of darkness submerged the land-lines of knowledge, and human consciousness was almost blotted out. Those blank pages are the "dark ages"

which have separated the several periods of civilisation during our recorded order of time, and they are the particular cause of that insulated conception whose most liable error is to accredit the preponderance of modern knowledge exclusively to the discoveries and inventions of our own day.

Our particular paragraph in the course and history of time is already designated the age of steam, and we almost imperceptibly associate the discovery of its power with the names of Worcester, of Watt, and their successors; but, if not to others, had not the immeasurable potentialities of that power been revealed to Hero of Alexandria some centuries before Christ? And, did he not direct its energy for the movement of his æolopile, or steam-turbine, whose principle is the basis of the great motive turbines of to-day.

Ours is also the day, not only of specific knowledge, but also of the transmission of information between the uttermost parts of the earth by the devices of paper and printing; yet early in the Christian era we find Pliny saying that "all the usages of civilised life depend in a remarkable degree upon the employment of paper. At all events, the remembrance of past events." A more recent author declares that "both block-printing and movable types were the production of the Chinese, with which they printed myriads of volumes of their strange literature during centuries when Europeans were painfully inscribing their thoughts with the stylus upon papyrus and the dried skins of animals."

Again, the triumphs of modern agriculture, on first thought, might appear to be exclusively our own, and the glory of our own time. We learn, however, and upon evidence that we cannot contest, that the Egyptians were strong in the art of agriculture, and that their discoveries were handed down to the Greeks, whose ablest writers conserved them in volumes setting forth their experiences in land cultivation, in the production of cereals and fruits, and in the improvement of their horses and cattle. Upon the subject of agricultural implements an amazing example is at hand: A machine for harvesting grain was invented, it is supposed, some 1,800 years ago. This invention was described by Palladius some 200 years later, and in words that might occur in an agricultural journal of to-day. Palladius writes:—"In the plains of Gaul they use this quick way of reaping, and, without reapers, cut large fields with one ox in a day. For this purpose, a machine is made, carried upon two wheels; the square surface has boards erected at the side, which, sloping outward, make a wider space above. The board on the fore part is lower than the others. Upon it there are a great many small teeth, wide set in a row, answering to the height of the ears of wheat, and turned upwards at the ends. On the back part of the machine two short shafts are fixed like the poles of a litter; to these the ox is yoked, with his head to the machine. When the machine is pushed through the standing corn, all the ears are comprehended by the teeth, and cut off by them from the straw, and drop in to the machine. The driver sets it higher or lower as he finds it necessary. By a few goings and returnings the whole field is reaped. This machine does very well in the level and smooth fields." In this description of the machine at work upon the plains of Gaul, not less than sixteen centuries ago, we find the principle, and much of the construction, of the "Modern Harvester" which has but very recently been introduced as a wonderful and new thing upon the plains of North America and the Downs of Queensland. We who know anything of the harvesting of wheat, of barley, and oats in the fields of Old England remember that, merely two or three decades ago, the only implements at work were the sickle and the scythe; and we are now forced to believe that the reaper, splendid as it is, of to-day, is apparently but a revival of the machine of the age of Palladius, re-invented after a dark lapse covering many centuries of time.

Although we are compelled to see that much of our knowledge was extant some ages ago, and that certain of our present inventions are but revivals of devices that were used, and had probably become obsolete, amongst the nations of old, there are certain lines of discovery and given fields of technical practice

of which it may be said, with a greater show of certainty, that they are the exclusive offspring of our modern time. With all that is remarkable in the achievements of the ancients, we do not read that they had recourse to the modes of observation of the laboratory, or access to the revelations of the microscope. The study of the laws which comprehend the substance and being of natural things is relatively a very recent thing, and chemistry, electricity, and biology are the achievements of to-day. They stamp our modern time, and teem with beneficence and material good to every class of men. Other schools of learning, in respect of their fruits, were, in the earlier times, the privilege of the rich and the few; and, the general condition of the people of all lands was as little blessed by it as were the common citizens of Rome. "In Rome, the labourer received little respect beyond the beasts whose burdens he shared, and the inventor found no protection under her mighty jurisprudence." Again, "the middle ages carefully repressed the minds of men, and hid away in the recesses of the schools, and in the houses of the great, the instruments of knowledge." The natural sciences, in letter and in practice, have brought forth goodness to the rich and to the poor, and have thus commanded the gratitude of all classes of mankind. Even long before its more recent bounties had fallen upon men, Macaulay is found declaring the beneficence of science in his overflowing strain:—"It has lengthened life; it has mitigated pain; it has extinguished diseases; it has increased the fertility of the soil; it has given new security to the mariner, and new arms to the warrior—these are but a part of its fruits, and of its first fruits, for it is a philosophy which never rests, which is never perfect. Its law is progress. A point, which yesterday was invisible, is its goal to-day, and will be its starting post to-morrow."

THE BASIS OF TECHNOLOGY.

Physical science comprehends the several divisions of investigation which treat of the elements and composition of matter, and of the laws which govern existence in its various and changing forms. Technology, it will be found, is the great harvester of the discoveries and fruits of these sciences, receiving their findings and devoting them to industrial use. Technology, therefore, rests upon natural laws, and its progress follows their discovery, understanding, and control.

In the year 1774, the English chemist, Priestley, discovered the gas which is known as oxygen. Amongst other of its characteristics, the one most remarked was the power to cause other bodies to burn with great rapidity when ignited in its presence. Priestley failed to observe the supreme functions of the newly discovered element, which he brought before the notice of the French chemist, Lavoisier. After but a brief time, Lavoisier discovered that oxygen was one of the composing gases of common air. With this second discovery the whole subject of *combustion* and the commanding part that the atmosphere plays in that process were revealed to the intellect of the great Frenchman. In 1772, Lavoisier delivered a sealed treatise to the French Academy in Paris. One possible reason why that communication was transmitted under seal must appear strange to us in our day. The fact was, however, that the great philosopher was marked by the authorities, by reason of his discoveries, as a danger to the laws and ways of the land. So serious and fatal did the situation eventually become, that he was claimed by the revolutionary movement of his time, and fell a victim to the guillotine in 1794. A like fate awaited Priestley, who had to flee from a similar movement in England to America, where he died on the banks of the Susquehanna. The communication, however, that Lavoisier delivered to the French Academy gave the results of his further studies of the behaviour of the element oxygen in combination with other bodies. He had observed that when the substances sulphur, phosphorus, and similar common bodies were burnt in the air they increased in weight; and he further determined that the increase in the weight was fully accounted for by the amount of oxygen gas that had been taken up during the combustion of the burnt substance. To this process of

combustion was given the name of *oxydation*. On the other hand, he also showed that, when other common bodies were burnt for the recovery of the metal, a loss of weight took place in the burnt substance, and that the loss of weight was equal to the weight of the gas that was set free, which gas was identical with, or a compound of, the element oxygen. To this process, where the loss of weight was due to the removal of oxygen, the term *reduction* was given. In these discoveries lay the kern of the law of the indestructibility of matter, which was to be discovered later.

Observation now, however, was not solely confined to the processes in the laboratory, but was addressed to common phenomena that were appearing in daily life. As a simple example, it was discovered that the rust which gathers upon common iron, when exposed to the air, is due to the effort of the element oxygen to regain the association with the metal from which it had been driven in the process of burning and manufacture. Iron rust is iron oxyd, and arises from the gradual oxydation of the metal by the oxygen of the air. The experiments in the laboratory and the observation of common phenomena in open life, however limited at the time, were ample to enable the great Frenchman to see the enormous function that the atmosphere exercises in the processes and changes incident to common bodies, and to note that those processes are due to the action of oxygen, which is an element in common air.

Late in the eighteenth and early in the nineteenth centuries, a brilliant company of investigators were engaged in developing the mines of new knowledge discovered by Lavoisier and his contemporaries and, in making further discoveries which were destined to lead to still more impressive and epoch-making results. Amongst that brilliant company none was so great nor so wide-reaching in conception and conclusion as Dalton, the philosopher and investigator in Manchester.

The English chemist was engaged along lines more or less parallel to those that had been followed by Lavoisier. By this time, however, other primary elements of matter had come into common knowledge, and Dalton was carrying on investigations with gases of which carbon, hydrogen, nitrogen, and oxygen were known to be constituent parts. In examining the composition of marsh gas and of a related gas, Dalton observed that, while those gases were both composed of carbon and hydrogen, marsh gas was made up of the same amount of carbon, but precisely double the amount of hydrogen, that the related gas contained. His investigations were extended so as to embrace the composition of other gases in which oxygen was allied in one case with carbon and in another case with nitrogen, and he was astonished by observing that identical circumstances occurred in the composition of the latter gases. that he had noted in the case of the gases where hydrogen was in combination with carbon. He found that in one gas (carbonoxyd) a given weight of carbon was allied to a given weight of oxygen, and that in a related gas (carbonic acid) the same given weight of carbon was combined with precisely double the weight of oxygen. The examination of the several gases in which oxygen is associated with nitrogen brought Dalton upon the same recurring facts: He found a given weight of nitrogen in one case, combined with a given precise weight of oxygen; and in another case, precisely double the weight of oxygen, thus repeating, to his profound amazement, the precise phenomena that he had discovered in the relations of oxygen and hydrogen to the element carbon in the gases already mentioned. These repeated observations led Dalton to lay down the laws now known by his name, to the effect that "bodies combine in exact proportions by weight, or in multiple proportions thereof"—a definite weight of carbon unites with a definite proportion of oxygen, or with precisely the double or multiple proportion of oxygen.

The stage at which the great philosopher had now arrived in the enunciation of those fundamental laws was only the stepping-stone towards the vaster comprehensions which they were destined to lead him to. Dalton had deter-

mined, by personal observations in the laboratory, that given elements combined with other given elements to form given bodies in absolutely precise and definite proportions, and that they could not unite in any other than in those exact proportions. His observations had been repeated by a growing host of chemical workers, whose investigations had dealt with the nature and composition of a vast number of bodies in which such metals as sodium, potassium, magnesium, iron, lead, nickel, silver, gold, and other of the bodies now known as elements were included. Their labours, which also included investigations into the composition and chemical structure of organic and living bodies, furnished an enormous mass of data which contributed directly to amplify and consolidate the primary observations at which Dalton had arrived. It was uniformly observed in all quantitative determinations of composite bodies that any element entering into the composition was contained in a definite proportion by weight, or in an exact multiple proportion of that weight. It was further established that a specific and invariable weight attached to each individual element in all its relations and associations with other individual elements. Taking the gas hydrogen as a standard, by reason of its minimum weight, then it was found that oxygen combined with hydrogen to form other bodies in a proportion by weight, which was invariably equal to sixteen times the weight of hydrogen. The combining weight of carbon was invariably equal to twelve times the weight of hydrogen; and in the case of all the other elements it was found that a fixed combining weight is attached to each individual element, and that while no two or more elements are alike in their specific or combining weights, yet each element in every case, and invariably, enters into combination with other elements in the proportion of its own specific or attached weight or in exact multiples of that weight.

With this accumulated mass of evidence in his possession, and all pointing along one pronounced direction, the intellect of Dalton moved on towards his great and supreme conclusion. He returned to an ancient idea that had been suggested by Leucippus, that bodies are composed of ultimate parts. In the place of indefinite "bodies" he substituted definite, inviolable *elements*, each one of which has its own specific and inviolable weight, which specific weight he used in order to express the ultimate or least particle in which an element can exist as an atom or molecule of matter.

With the idea of the final atom conceived, and the facts established beyond any refutation, showing that the elements combine in definite and invariable proportions by weight to form all bodies and substances, there came forth Dalton's grand and comprehending theory of the *Atomic Constitution of Matter*.

The atomic theory, aided by the array of facts relating to material things by which it was supported, revolutionised thought, and transformed the aspect of material being. Hitherto matter had been very much looked upon as an indefinite and imponderable mass. The term to the general mind had been so far circumscribed in its meaning as to relate almost exclusively to earthy, inanimate things. Vegetable substance and animal organisms had been regarded as utterly different orders of things, and not only in form and mode of existence, but also in their elementary composition. The "New Knowledge" dissipated all this misconception and ignorance. When the elements had been discovered, and had increased to approaching their present number, and when the growing army of chemists had traversed widely the mineral, vegetable, and animal kingdoms by chemical analysis, and the substance of all forms of matter had been reduced to its initial constituents, the supreme fact could no longer be resisted that, in their material consistence, all things are made of the same simple parts. The oxygen, nitrogen, and carbon which compose the air; the hydrogen and oxygen which constitute water; the silicon, calcium, magnesium, iron, sulphur, phosphorus, and other elements which go to the building of earth and rocks,—all these are found in the substance of vegetable forms, and in the bone, flesh, and tissues of animals and of man, and they are

just as essentially the materials of their structure and composition. Whether the simplicity or the vastness of the system of the universe, which these discoveries have revealed, is the more impressive, the human intellect is unable to conclude.

The labours and investigations, then, of the great pathfinders in natural knowledge have laid the foundation of a grander conception and a truer understanding of the whole Kingdom of Matter. They, however, have done much more than to transform the conception of men concerning the material structure of the world in which they live. It will be seen that, in discovering the elements composing universal matter and the laws which govern its phenomena, they have laid, deep and sure, the basis upon which Technology, with its myriad processes, rests.

TECHNOLOGY IN PRACTICE.

As the discoveries in physical and chemical science came to knowledge, men of a different and more commercial temper of mind began to ask, "What do they mean, of what use are they, to what practical account can they be turned?" Yes, the leader of commerce and affairs has just as essentially his part in these matters as the discoverer who has made them possible. For the great investigator is often content to have unfolded a natural law or disclosed some great fact. The inventor and the pioneer of trade are waiting and alert to accept his findings, and to adapt them to some industrial end. Discovery is the forerunner of invention, since an invention is but a means for the utilisation of a natural law. After the discovery of the power of steam came the engine to utilise and direct it.

In the latter part of the eighteenth century it was observed that the elements discovered by Dalton and others possessed what are known as electrical properties. It was also found that the electrical properties or equivalents of the metallic elements were in no case alike. Each element is what is termed "positive" or "negative" to the other elements. As a result of these discoveries, electric batteries came into use; Volta, an Italian scientist, having invented the famous pile known by his name. His battery consisted of plates or discs of copper and zinc, which were separated from each other by being placed in alternate jars, but connected together with a metal wire. So long as these connected discs of copper and zinc were kept dry they remained utterly unchanged and without action. When, however, they were simultaneously immersed in water containing an acid, an instant motion began, and a flow of electricity was the result. By connecting the battery with a metal wire, which wire it had also been found was capable of conducting the current, the electricity was carried to points at a distance, and eventually the electric telegraph and telephone came to pass. The point that we must not miss, however, is that the battery only works when the copper and zinc are immersed in and under the action of the acid. And what was the explanation? It was found, when the copper and zinc were in the solution of acid, a decomposition of the metals proceeded; that this decomposition was the result of oxydation, and that the current of electricity is only produced so long as unused metal and unused acid are present to react upon each other. It is thus seen that Lavoisier's "Law of Combustion" and Dalton's "Law of Exact Proportions" are both in demonstration. Oxydation is the process by which the decomposition or combustion of the metals is caused, and the electricity is generated so long as definite proportions of the metals and of the acid or other source of oxygen come together. When either the metal or the oxydant is used up, the process stops. To-day the technical applications and uses that have followed from those discoveries are so common as to pass notice. Yet if we pause for a while in review, and traverse slowly the course of progression from the kite-flying of Franklin and the chemical battery of Volta to the electric cars upon our streets, the despatches of Marconi, and the revelations of the Röntgen ray, a current of persuasion moves through us, conveying to our consciousness what chemico-electric science has done for men.

We have already related that when Dalton came upon his "Law of Exact and Multiple Proportions" he was engaged, in addition to other bodies, in the study of marsh gas. It has been told that in its composition a precise amount of carbon was found to be in combination with a precise amount of hydrogen. It became known, by further experiments, that in the formation of that gas one part of carbon is invariably combined with four parts of hydrogen. Marsh gas formed the subject of still further investigation, and very particularly in association with another gas known as chlorine, an element which in its free state is most destructive of animal life. Dumas, a chemist at the University of Geneva, found, when marsh gas was brought into contact with chlorine gas, that the chlorine had the power to drive out the element hydrogen from its combination with the carbon, and put itself in the place. There are, as already said, four parts or atoms of hydrogen allied to one atom of carbon in marsh gas. Dumas showed that one atom of chlorine could substitute one atom of hydrogen, and that two, three, or four atoms of chlorine could substitute as many atoms of hydrogen, and drive the latter completely out of its association with the carbon. A most vitally important discovery arose out of these experiments. Dumas observed that when three of the atoms of hydrogen were substituted by three atoms of chlorine a highly volatile body resulted, having a pungent odour, and which was able to temporarily or finally overcome animal consciousness. That body was *chloroform*. To-day there is not an operating-room nor a hospital that is without this simple chemical product or others belonging to its class. And yet let us look at the performance. One deadly gas is brought into contact with another deadly gas, and a body results that is charged with the highest human beneficence. Only three primary elements are engaged in the whole achievement. If we bring in one more, the metal sodium, and take the chlorine away, leaving the carbon alone, then the deadly chlorine joins with the sodium to furnish our common table salt; and the carbon may remain alone as the substance of the diamond, or it may have associated itself with hydrogen and oxygen to furnish alcohol, or with other proportions of the same two elements to give us sugar. All these utterly dissimilar yet well-known bodies are derived by the combinations and transpositions of only five of the initial elements, each one of which associate with the others invariably in its own exact or multiple proportions.

Mining and the recovery of the metals, which the ancients regarded as masses or bodies and not as elements, are amongst the oldest of arts. The Greeks claim the earliest production of iron, but there is evidence to show that the art was known to the Egyptians, the Hindoos, and possibly at an early age to the people of Africa. Livingstone, in the records of his African travels, speaks of finding amongst the natives crude devices for the making of iron. According to tradition and record, gold and silver were the symbols of glory and of estate with kings and peoples of old, as they are also the measure of power and station at the present time. It would appear though that in those days the precious metals were found in easier abundance, and more "free" to hand, and obtainable without the metallurgical devices that are required for their economic recovery from the ores that are treated to-day. "Free" gold was clearly found in what now appear fabulous amounts, and we actually learn, from records that are not questioned, that the Spanish conquerors of Peru shod their horses with beaten silver in the absence of baser metal.

Yet the technology of mining followed the advent of the chemist. In the making of iron, the ancients were aware, as Doolittle has said, "that the melting could be done more effectually when the fuel and the ore were mixed and enclosed by walls of stone; that the fire and heat could only be started and maintained by blowing air into the fuel, and rude bellows were constructed for the purpose." The science of iron manufacture, in its present state, did not come into practice until during the latter half of the nineteenth century, when Bessemer and others perfected systems for securing a more

intense application of the oxygen of the air in the oxydation and removal of silicon, sulphur, phosphorus, and carbon, which are the elements associated with iron in the ore. In the case of the precious metals, "they were doubtless first found in their native state and mixed with other ores, and were hammered into the desired shapes with implements of the hardest stone." To-day the McArthur-Forrest or cyanide process and the process of chlorination practically govern the output of gold; and both of these processes are of extremely recent date. Chlorine, the vital agent of the chlorination process, was not discovered till close to the nineteenth century. It was used, as we have already said, by Dumas in the discovery of chloroform, and several decades passed before its power as an oxydant, in which it rivals in chemical combustions the energy of oxygen, became known.

The kingdoms of vegetable and animal matter and life are the spheres, however, in which physical science has made its most profound revelations. We have said that, in the unfolding of the elements which are the primary constituents of matter, those elements were discovered to lie at the basis of structure of plant and of animal organisms as well as of rocks and inanimate earth. From the drop of protoplasm, which is all that can be said of the lowest beginnings of life, and the forms which mark biologically the parting of the way where living matter takes the vegetable and animal directions, to the highest order in plants, and the consummation in the organism of man, we repeat, all things are made of the same simple parts. Carbon, hydrogen, oxygen, nitrogen, phosphorus, sulphur, with many of the remaining elements, enter into the structure and consistence of everything vegetable and animal that exists. Even the colours of the autumn leaf and the aroma of the rose, with the nerve threads in the subtle organism of man, are determined by the combinations and transpositions of those ultimate atoms. In fact, those few elements are as the alphabet of matter, out of which all things have been constructed; just as the words and sentences which comprise our language are built up from the twenty-six initial letters.

And the laws of combustion of Lavoisier, to where do they extend in the sphere of established knowledge of our time? The French chemist made known that the oxygen of the air was the vital agent of combustion of bodies in the laboratory, and in the rusting of iron on the wayside. To-day those laws are known to govern the accretion of substance by plants, and its resolution into motion by man. They inspire and control all formation and change in matter and in life.

Agricultural chemistry, like other branches of the science, has dealt with matters peculiarly its own. It has inquired into the origin and chemical composition of soils; into the relation of soils to crops which grow in them, and into the nature of the dependence of animal life upon vegetable substance which is drawn from soils and from the air.

The agricultural chemist has discovered that soils can vary, within wide extremes, in their content of the elements which go to the making of plants and, without which, crops cannot grow; and also that plants differ as greatly in their respective requirements of the several elements upon which they feed. It has been established, however, that no plant structure or life is possible without the use of certain vital elements, some of which, we have said, are gathered from the air and others from the earth.

In the examination of the parts which compose vegetable and animal substance, agricultural science has shown that not only do the same primary elements lie at the basis of structure in each of these kingdoms of life, but that those elements are arranged and combined to form the same orders of chemical bodies that are contained both in animal and vegetable organisms. The proteids, "the bearers of life," are as essentially and invariably present in animals as in the plants upon which they feed. The oil in plants and the fats in butter, in beef, and in fish are of one chemical structure and class; while the glycogen in the liver, the lactose in milk, no less than the sucrose

in cane and in beets, belong to the family of sugars. It is the occurrence of certain sugars in human secretions which denotes given forms of disease.

All these several discoveries were great results in themselves; they were destined, however, to lead on to technological processes that were to place the practice of agriculture much more effectively within the control of men. When analysis had shown that given soils were naturally deficient, or had become depleted by continuous cropping, in the vital elements such as lime, potash, phosphoric acid, and nitrogen, which all crops and some very particularly require, agriculturists were directed by science to make good those deficiencies from outside supplies which discovery had brought within reach. The application to-day of definitely composed fertilisers to special crops growing in soils that are known to be lacking in the specific elements that the crops need and the fertilisers contain is an essential part of rational agriculture in all advanced countries. Again, when plant analysis had brought to light the different compositions of various crops and feed stuffs, and actual tests, conducted under chemical control, had demonstrated which of the constituents of those stuffs and crops go to the making of bone, of beef, and of butter, and to the production of animal labour and force, it became possible for the advanced farmer to feed so as to reach any desired result.

Chemical analysis relates to the materials which constitute human food. Animals draw their bone, muscle, tissue, and fat-forming elements from grass, hay, corn, and roots. Men depend upon the same constituents—proteids, fats, sugars, starch, and some mineral matter—for growth and life, and they derive those things partly from vegetation, but also from the flesh and products of cattle. Therefore have technical processes arisen for the devising and testing of kinds of food. The laboratory is engaged in determining the curd, fat, and sugar in milk; the proteids, oils, and carbo-hydrates in seeds and fruits; while the microscope unites with chemical analysis to safeguard and police all prepared meats and every devised drink that we consume.

Returning for a moment to the earlier part of our subject, and to the laws which it has been shown govern chemical combination and the constitution of matter, we ask, Are we still able to note the operation of those laws in the growth of plants and animals, and in the technical processes which govern modern agriculture in the field? We have seen that vegetable, and also animal, organisms are composed by bodies having a definite and invariable constitution. In the growth of plants, their substance is formed by the accretion of elements which come together in precise and invariable proportions. Those elements of growth are drawn from the air and from the soil. Some soils are too sterile to grow a crop, and thus to produce a cow. But many and useful soils are lacking in sufficient lime, potash, phosphoric acid, and nitrogen, which are the special elements which plants cannot lack, and still continue to grow. When the farmer supplies those elements to the crop, he supplies just so much, because he now knows how much enters into its composition. When he buys the materials which furnish those elements, he also buys only so much, because science has also told him precisely how much of the respective elements the material, if pure, should contain. Unless 1 ton of nitrate of soda contains 367 lb. of nitrogen, and unless 1 ton of gas-works manure or sulphate of ammonia contains some 490 lb. of nitrogen, and unless 1 ton of sulphate of potash contains not less than 1,200 lb. of actual potash, then the farmer may know that those materials are not pure, and that he is probably being defrauded; because the laboratory has told him that those respective proportions of the said elements must invariably be present if the materials are pure and unadulterated, by reason of the law of exact proportions which governs the formation of every chemical substance. The laws, then, discovered by the great chemist Dalton are controlling the technical processes of the farm, and even some of the commercial transactions of the exchange, just as essentially as they govern the structure and phenomena of universal matter.

WHAT, THEN, IS TECHNICAL EDUCATION?

The answer to this question is already given in the preceding parts of this address, the first of which treats of certain of the natural laws that form the basis of technology, and the second part which furnishes some examples of technology in practice. Technical education comprises a deep, precise, and connected knowledge of the laws which govern the formation and behaviour of matter, and a trained and actual acquaintance with the mechanical and chemical devices by which those laws are directed to industrial ends. The student of technology must traverse the fields of investigation opened up, and know precisely, and with exactness of relation and detail, the discoveries in material things achieved by the great pathmakers in natural knowledge; and he must learn, by systematic practice and experience in technical process, to put his knowledge into use. The lecture-room, the laboratory, the workshop, and the farm must all aid in attaining the final result; yet, unless the foundation is laid deep and sure by a knowledge of the laws which underlie technical practice, that result will be deformed and only half-grown and next door to useless.

We must bear in mind that a knowledge of technology does not lie in a mere interest in natural things—in gathering from books a little stray knowledge of what some men have discovered and of what others have done. Technology is not one of the decorative arts, to be used for our intellectual adornment and display. It is a study broad and profound; and, to the man who elects to live by it, it is a business whose demands are rigid, exacting, and precise.

That it is important, no one should delay or waste one moment in discussing. Technology is the system, and its processes are the means by which the business of the world to-day is conducted. A nation is materially advanced in the proportion that applied science has the charge and direction of its affairs. England was the birthplace of the more notable of the men who laid the foundations of the science of chemistry. But what have her schools, her people, and her legislators done with the subjects of their discovery? They have left them largely to be the theme of the popular lecturer, and the "electives" of students at college. And what is the material result? Professor Dewar assured the British Association last year that in technical education England is fifty years behind Germany. And this year the British consul at Stuttgart, in a consular report, has advised the Foreign Office in London that the annual production of the chemical industries alone of Germany amounts to £50,000,000. Up to about the present, the more advanced manufacturing houses in England have largely drawn their technical experts from Germany, while the more serious English students of technology have sought their technical education and training abroad.

This, then, is also a subject which concerns the Australian nation. And if, from the federation of the States, is to date an era of greater and more modern progression, the Commonwealth, through its Government, must initiate, and upon a more adequate scale and with all seriousness and despatch, the lines of technical process upon which modern material progress depends. Australia, at the present, looks to her agriculture and to her mines, whatever other industries she may develop in the course of time. These must receive her constant and more serious care. Her primary industries are practically her all, and the national legislation must come to the aid of science in establishing, upon a broad and systematised basis, the most modern ways and means of helping production, and in securing to the producer markets at home and abroad. We say at "home" as well as abroad, and for the reason that, unless the future technical producers of this country are trained as the young men of the continents of Europe and America are trained, and unless our industries are directed and controlled by the most modern knowledge and methods, we shall not only be unable to find a place in the world-competition outside, but the markets will be taken from us within our own gates.

THE USE OF CARBON BISULPHIDE AS AN INSECTICIDE.

The following information and instructions as to the use of carbon bisulphide as an insecticide are reprinted from a pamphlet prepared by Mr. H. H. Cousins, M.A., F.C.S., Government Analytical and Agricultural Chemist, Jamaica. Mr. Cousins explains that on account of its high volatility and inflammable nature, carbon bisulphide requires special precautions in its package for transit. Owing to the objection on the part of steamship companies to carry it, this article is most difficult to obtain in the tropics. Arrangements have been made by which the Jamaica Government will import it, the Island Chemist having charge of its distribution:—

Properties.—Carbon bisulphide is a liquid one-fourth heavier than water (specific gravity, 1.29). One gallon weighs nearly 13 lb. It is very volatile, and evaporates rapidly when exposed to the air. It is highly inflammable. Its vapour, when mixed with air, is liable to explode when ignited. It boils at 115 degrees F. Its vapour is much heavier than air, and always tends to flow downwards.

Its vapour possesses a sweetish smell when perfectly pure. The commercial article always has a more or less objectionable odour. It should not be inhaled in any quantity, as it causes dizziness and palpitation of the heart. Fresh air is the best treatment in case of a person becoming affected by the vapours.

SIMPLE RULES FOR SAFE STORAGE AND HANDLING.

1. Keep it in the special iron drums, or, if in small quantity, in stoppered bottles. See that the stoppers are tight.
2. Store in a dark, cool place, preferably an outside store, where fire or light will not have access to the liquid.
3. In pouring out a supply, take care that no flame or even a lighted cigar or pipe of tobacco is near. Arrange to have the vapour as low as possible so as to avoid breathing it.

INSTRUCTIONS FOR USE.

For the destruction of insects in the soil, root-borers, and ants, as well as for sterilising soil in which seeds or plants liable to injury from insects are to be raised, carbon bisulphide is an effectual agent.

(a.) *Root-borers.*—The liquid itself is destructive to any root brought into contact with it. The vapour, however, in regulated quantity, is harmless to roots, and highly destructive to insect life in the soil. Hot, dry, sandy soils should only be treated when they have been thoroughly moistened with rain or irrigation water. As a general rule, it is desirable in all cases to use carbon bisulphide when the soil is still damp, since its action is thereby better controlled and regulated. Bore holes at the rate of 4 per square yard to a depth of 12 inches. No hole should be within 18 inches of the tree-trunk. Pour $\frac{1}{4}$ oz. of the liquid down each hole. Special appliances are sold for this purpose, enabling two men to make 2,000 injections per diem. For occasional use, the holes should be made with a crowbar and the liquid poured down an iron tube. The earth should be trampled over the hole after treatment. In some cases the holes should slope toward the tree-trunk, so as to reach insects under the central point.

(b.) *Ants.*—When the nest has been located, bore two or more holes to a depth of 1 to 2 feet in the centre of the nest, and pour 2 oz. of bisulphide down each hole. Close the hole with earth immediately.

(c.) *Borers in Trees.*—Where the sawdust and castings indicate an active borer at work, inject a little bisulphide with an oil-can into the hole and stop the opening with clay.

(d.) *To Sterilise Soils for Seedlings and Delicate Pot Plants.*—Place the soil in a suitable box or tin, with a close fitting lid. Pour on 1 oz. of bisulphide per bushel of soil; after two days, spread the soil out in the open air. All insect life in the soil will thus have been destroyed. This treatment is found not to injure in any way the fertility of the soil.

(e.) *To Disinfect a Granary.*—Where large quantities of grain are stored in a building and serious losses through weevils and other insect pests occur, it

is a great advantage to treat the whole building with carbon bisulphide. To do this certain obvious precautions are necessary:—

- (1) The building must be made fairly tight. Ventilators must be papered over and doors made to shut close.
- (2) Preparations must be made so that a number of men can enter the granary simultaneously, each to pour out in a prepared receptacle the requisite dose of bisulphide and then immediately to retire. The building should then be kept close for forty-eight hours and all windows and doors opened for four hours before it is again occupied by men.
- (3) Stringent precautions to preclude any chance of firing the inflammable vapour must be taken.

For every 25 square feet of floorspace supply 1 square foot of evaporating surface (flat tins or dishes).

Each pan or dish should receive 1 lb. of liquid. The dishes should be placed on level supports 4 feet from the ground. An entire store of grain could thus be freed of insects at one operation extending from Saturday to Monday.

(f.) *To Free Grain from Insects on a Smaller Scale.*—Carbon bisulphide in the proportions here recommended will destroy insects in grain without affecting the germinating powers of the seeds.

Every person who stores corn, peas, or other grain subject to insect attacks should prepare a fumigating box as follows:—

Obtain a barrel, puncheon, or packing case of suitable size. Line the inside with building paper stuck on with a mixture of varnish and whitening (chalk). Construct a lid which can be fastened down firmly on a bearing coated with felt. For every 50 cubic feet of space in the receptacle employ 1 oz. of bisulphide. For an ordinary flour barrel one teaspoonful ($\frac{1}{8}$ oz.) of bisulphide should suffice, if the receptacle be tight and free from leaks.

Place the bisulphide in a saucer on the surface of the grain, keep tightly closed for thirty-six hours.

(g.) *Clothes Moths.*—Great damage to clothes is done in the tropics by various species of moths. Camphor and naphthaline or pyrethrum insect powder tend to keep the adult insects away, but the former, at any rate, have no effect on the larvæ when they have once commenced their attack on the clothing.

Before putting clothing, woollens, or furs into store it is advisable to treat them with carbon bisulphide. An ordinary tin trunk can be used if newspapers are spread over the top and the lid kept tightly closed. Pour half a wine glass-full of the liquid on the surface of the clothing, spread the papers quickly and shut tight. Should the box be opened at intervals afterwards, naphthaline balls or insect powder serve to keep away a fresh infection. The liquid will not injure the clothing or leave any stain.

(h.) *Household Insects.*—Should it be desired to destroy cockroaches, bed bugs, or fleas in a house, it should be treated on the lines laid down for disinfecting a granary.

A suitable time for this treatment would be an occasion when the house is to be shut up for three or four days or longer. Individual rooms could be treated, if desirable. Stringent precautions to avoid ignition of the vapours or their inhalation by human beings are of course necessary.

(i.) *Insects in Tobacco, Museum Specimens, and Books.*—These can be readily destroyed by treatment in a suitable, closed vessel with carbon bisulphide. If the receptacle be tight, 1 oz. of bisulphide will suffice for each 50 cubic feet of space. The treatment should last for thirty-six hours.

AUTHORITIES UTILISED.

Carbon Bisulphide as an Insecticide.—W. E. Hinds. Farmers' Bulletin 145, U.S.A. Department of Agriculture.

Insects Affecting Tobacco.—L. O. Howard. Farmers' Bulletin 120, U.S.A. Department of Agriculture.

Household Insects of U.S.A.—F. H. Chillenden.

Chemistry of the Garden.—H. H. Cousins. Macmillan and Co., Ltd.—*Agricultural News*, Barbados.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1903.												1904.
	Jan.	Feb.	Mar.	April	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
<i>North.</i>													
Bowen	1.66	7.65	16.44	1.41	2.04	2.77	0.31	0.22	0.51	1.36	3.14	6.13	3.45
Cairns	21.32	10.28	32.51	15.50	1.67	0.51	0.87	0.44	0.47	0.91	3.10	13.51	9.26
Geraldton	38.94	17.24	45.00	14.03	7.48	3.42	2.07	7.08	3.79	3.05	7.13	37.86	24.37
Herberton	6.88	3.69	20.80	12.04	0.64	1.00	0.19	0.33	Nil.	0.67	6.21	15.52	8.01
Hughenden	1.52	0.99	0.95	0.81	1.73	Nil.	0.07	0.31	0.65	0.80	2.36	5.30	2.71
Kamerunga	20.36	10.82	37.45	19.32	2.14	0.50	1.10	1.50	0.86	1.39	4.94	14.33	7.37
Longreach	1.81	0.09	3.48	Nil.	3.51	Nil.	0.69	Nil.	1.58	0.90	0.83	1.76	1.77
Lucinda	17.43	11.66	44.24	6.44	6.36	2.44	2.38	4.39	0.30	0.76	10.67	40.34	11.71
Mackay	10.45	6.47	13.51	1.50	6.75	2.49	2.53	0.59	0.44	1.54	9.86	5.52	16.74
Rockhampton	0.92	1.68	3.73	1.12	6.93	0.08	3.73	0.68	0.51	1.84	7.12	4.08	5.12
Townsville	4.66	8.11	19.80	1.61	2.08	1.02	0.05	0.19	0.44	2.42	5.97	19.02*	5.45
<i>South.</i>													
Barcaldine	3.73	0.40	0.94	Nil.	4.92	Nil.	0.90	0.50	4.23	1.01	4.00	0.92	3.26
Beenleigh	1.88	4.77	6.49	1.90	12.40	0.92	5.04	2.26	4.13	3.29	4.78	1.60	2.81
Biggenden	2.25	3.15	3.95	0.16	1.28	2.07	3.90	1.62	2.23	2.77	4.37	5.62	7.48
Blackall	3.04	1.50	3.87	Nil.	5.19	Nil.	1.81	0.75	2.25	0.45	2.56	1.79	2.28
Brisbane	1.31	5.35	4.79	1.33	11.82	0.73	5.56	3.84	4.73	3.65	3.98	2.19	2.65
Bundaberg	0.97	2.60	6.05	0.38	11.55	0.33	5.98	0.88	3.55	0.43	3.25	9.97	3.18
Caboolture	5.15	3.42	9.59	1.39	16.14	0.92	6.08	3.27	4.41	3.11	9.98	4.18	4.20
Charleville	1.70	0.43	2.94	1.06	2.91	0.02	1.61	0.62	3.40	0.95	2.20	2.98	1.87
Dalby	1.28	1.22	4.89	1.33	6.00	0.03	3.78	2.30	3.30	3.12	6.30	1.19	1.88
Emerald	2.30	2.49	1.48	0.26	3.43	0.02	0.57	0.24	1.28	1.90	2.21	4.30	2.70
Esk	1.32	3.51	4.46	1.25	9.27	0.30	2.97	4.21	4.86	3.69	4.02	1.43	2.37
Gatton College	3.68	3.81	2.60	0.79	7.55	0.17	4.15	2.50	3.56	4.71	5.05	1.04	2.15
Gayndah	0.77	2.08	2.30	0.09	6.03	0.05	2.81	1.06	2.62	4.37	3.03	5.12	7.01
Gindie	1.43	3.15	0.49	0.19	3.31	Nil.	0.51	0.30	1.58	1.97	4.06	4.26	1.52
Goondiwindi	1.84	0.72	4.40	1.73	5.07	0.15	4.38	2.09	4.22	2.16	3.73	3.62	2.90
Gympie	2.40	3.27	5.96	1.28	10.20	0.62	1.67	2.72	2.42	5.61	4.50	4.88	9.27
Ipswich	1.36	5.55	3.79	2.24	9.56	0.85	3.61	2.70	5.24	2.98	3.84	1.01	4.07
Laidley	0.71	3.63	2.63	0.95	8.20	0.20	4.65	3.06	4.25	5.47	3.87	1.82	2.93
Maryborough	2.09	2.76	3.23	0.66	9.58	1.60	6.17	1.09	1.93	2.62	3.96	5.04	2.64
Nambour	2.53	5.03	5.18	0.83	19.46	1.29	5.38	3.95	3.61	3.85	6.13	2.43	6.39
Nerang	3.36	4.73	4.84	3.04	15.75	2.36	7.34	2.21	3.81	3.52	3.86	4.24	3.89
Roma	0.75	0.15	2.48	0.39	3.17	0.34	2.26	1.13	6.61	1.92	3.16	4.21	1.85
Stanthorpe	0.23	1.59	0.95	1.18	6.87	0.74	4.71	1.98	6.07	3.45	4.45	2.59	2.29
Tumbo	2.43	0.15	4.73	0.02	1.96	0.01	2.64	0.27	4.33	1.03	3.17	2.91	2.48
Taroom	4.32	1.53	1.29	0.82	8.83	0.23	3.83	2.21	1.51	2.05	3.76	3.22	1.39
Tewantin	1.90	5.30	11.52	1.80	20.22	7.42	7.09	5.70	5.80	2.85	9.85	1.37	3.03
Texas	0.18	0.94	0.48	1.84	4.34	0.36	4.53	3.21	1.55	2.47	4.93	4.44	1.70
Toowoomba	2.21	3.42	3.60	1.27	7.94	0.31	3.90	3.00	4.06	3.82	4.85	4.27	4.26
Warwick	0.68	2.59	2.13	0.73	8.62	0.10	5.45	2.63	3.41	2.89	3.92	2.73	0.60
Westbrook	4.21	2.70	1.52	0.34	4.23	2.53	3.89	1.63	3.89	4.03	5.11	3.75	1.46

* One day gauge overflowed.

EDGAR L. FOWLES,

For the Hydraulic Engineer.

PRICES IN BRITISH MARKETS OF ARTICLES WHICH CAN BE PRODUCED IN QUEENSLAND.

BUTTER.—Australian, 98s. to 100s.; Danish, 110s. to 112s.; New Zealand, 98s. to 100s. per cwt.

CHEESE.—Canadian, 53s. to 54s.; New Zealand, 50s. to 52s. per cwt.

CONDENSED MILK.—18s. 6d. to 20s. 6d. per case, in 20-case lots.

SUGAR (duties, raw, 2s. to 3s. 10d. per cwt.; refined, 4s. 2d. and $\frac{1}{2}$ per cent.).—Refined, £15 to £17; raw, £11 to £13 per ton; German beet, 88 per cent., 8s. 4 $\frac{3}{4}$ d. per cwt.

MOLASSES (duty, 2s. per cwt. and $\frac{1}{4}$ per cent.).—5s. 6d. to 8s. per cwt.

RICE.—Rangoon, £8 to £13; Japan, £12 to £16 (rising); Java, £20 to £23; Patna, £16 to £18 per ton.

COFFEE (in bond, duty $1\frac{1}{2}$ d. per lb. and $\frac{1}{4}$ per cent.).—Ceylon plantation, 92s. to 120s.; peaberry, 60s. to 123s.; Santos, 31s. to 51s.; Mocha, 52s. to 90s.; Jamaica, 105s. to 130s. per cwt.

CHICORY ROOT, dried (duty paid.).—26s. to 31s. per cwt.

ARROWROOT.—St. Vincent, 1d. to 4d.; Natal, $6\frac{1}{2}$ d. to 8d.; Bermuda, 1s. 4d. to 1s. 6d. per lb.

WHEAT.—Duluth, 30s. to 32s. 6d. per 496 lb.; English, 28s. 6d. to 31s. per 504 lb.; Australian, 30s. $4\frac{1}{2}$ d. to 31s. per 480 lb.

FLOUR.—24s. 6d. to 31s. per 280 lb.

MALTING BARLEY.—27s. 6d. to 29s. per 448 lb.; grinding, 20s. 6d. to 21s. 6d. per 416 lb.

OATS.—New Zealand, 23s. to 28s. per 384 lb.

SPLIT PEAS.—39s. to 40s. per 504 lb.

GINGER.—Jamaica, 40s. to 60s.; Cochin, 65s. to 75s.; Japan, 24s. to 26s. per cwt.

VANILLA.—3s. to 7s. per lb.

PEPPER.—Capsicums, 18s. to 75s.; chillies, 38s. to 45s. per cwt.; black, 6d. to $6\frac{1}{2}$ d.; white, $9\frac{1}{4}$ d. to 1s. $0\frac{1}{2}$ d. per lb.

GREEN FRUIT.—American apples, 12s. to 24s. per case; bananas, 7s. 6d. to 13s. per bunch; pineapples, 3s. to 6s. each; oranges, Valencia, per 420, common, 6s. to 7s.; medium, 8s. to 12s.; fine selected, 14s. to 17s.; finest selected, 20s. to 22s.; lemons, Messina, finest selected, per 360, 18s. to 24s.; ordinary to fine, 5s. to 14s.

DATES.—Tafilat, 75s. to 80s. per cwt.; Persian, 8s. to 10s. 3d. per case; Egyptian, 11s. to 15s. per cwt.

COTTON.—Uplands, 7d. to $7\frac{1}{2}$ d. per lb.; Sea Island, $13\frac{1}{2}$ d. to 1s. 9d. per lb.

COTTON SEED.—£6 5s. per ton.

COTTON-SEED OIL.—Crude, 18s.; refined, 22s. 3d. per cwt.

COTTON-SEED OIL CAKE.—£4 10s. to £4 12s. 6d. per ton.

LINSEED.—31s. to 45s. 6d. per 416 lb.

LINSEED OIL.—£17 10s. to £17 15s. per ton.

LINSEED OIL CAKE.—£6 17s. 6d. to £7 2s. 6d. per ton.

OLIVE OIL.—£31 10s. to £40 per tun (252 gallons).

COPRA (cocoanut-kernel).—£15 to £16 per ton; £8 to £9 per ton at the S. S. Island trading stations. Corresponding value in Queensland, £10 to £12 per ton.

COCOANUT OIL.—£24 10s. to £31 per ton.

LUCERNE SEED.—56s. to 65s. per cwt.

CANARY SEED.—67s. to 75s. per quarter of 480 lb. = 8s. 4d. to 9s. 4d. per bushel.

MANILLA HEMP.—£25 to £30 per ton.

SISAL HEMP.—£35 per ton.

NEW ZEALAND HEMP.—£32 per ton.

FLAX.—£48 to £52 per ton.

TAPIOCA (duty, 5d. per cwt.).—2d. to 5d. per lb.

FROZEN MEAT.—The following are the Frozen Meat Trade Association's Smithfield market quotations for the undermentioned classes of frozen meat, based on actual sales of not less than 100 carcasses of mutton or lamb of fair average quality. These quotations are not for selected lines, but for parcels fairly representative of the bulk of the shipments now on the market:—

New Zealand Sheep.

(Crossbred Wethers and Maiden Ewes.)

	Feb. 13.	Feb. 20.
Canterbury, light (48 lb. to 56 lb.)	4 $\frac{1}{2}$ d.	4 $\frac{1}{2}$ d.
Canterbury, medium (56 lb. to 64 lb.)	4 $\frac{1}{2}$ d.	4 $\frac{1}{2}$ d.
Canterbury, heavy (64 lb. to 72 lb.)	4 $\frac{1}{2}$ d.	4 $\frac{1}{2}$ d.
Dunedin and Southland (56 lb. to 64 lb.)	4 $\frac{1}{2}$ d.	4 $\frac{5}{16}$ d.
North Island (55 lb. to 65 lb.) ...	4 $\frac{3}{8}$ d.	4 $\frac{1}{16}$ d.

Australian Sheep.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	3 $\frac{1}{16}$ d.	3 $\frac{3}{8}$ d.
Light (under 50 lb.)	3 $\frac{1}{16}$ d.	3 $\frac{3}{8}$ d.

River Plate Sheep.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	3 $\frac{1}{16}$ d.	3 $\frac{1}{16}$ d.
Light (under 50 lb.)	3 $\frac{1}{16}$ d.	3 $\frac{1}{16}$ d.

New Zealand Lambs.

Canterbury, light (28 lb. to 36 lb.)	5d.	5d.
Canterbury, heavy (36 lb. to 42 lb.)	5d.	5d.
Dunedin and Southland (28 lb. to 42 lb.)	4 $\frac{3}{4}$ d.	4 $\frac{3}{4}$ d.
North Island (28 lb. to 42 lb.)	None offering.	

Australian Lambs.

30 lb. to 40 lb.	4 $\frac{7}{8}$ d.	4 $\frac{7}{8}$ d.
-------------------------	--------------------	--------------------

River Plate Lambs.

30 lb. to 40 lb.	4 $\frac{3}{4}$ d.	4 $\frac{3}{4}$ d.
-------------------------	--------------------	--------------------

New Zealand Frozen Beef.

Ox, fores (180 lb. to 220 lb.) ...	2 $\frac{3}{4}$ d.	2 $\frac{3}{4}$ d.
Ox, hinds (180 lb. to 220 lb.) ...	3 $\frac{1}{2}$ d.	3 $\frac{1}{2}$ d.

Australian Frozen Beef.

Ox, fores (160 lb. to 200 lb.) ...	2 $\frac{7}{16}$ d.	2 $\frac{7}{16}$ d.
Ox, hinds (160 lb. to 220 lb.) ...	2 $\frac{3}{4}$ d.	2 $\frac{3}{4}$ d.

River Plate Frozen Beef.

Ox, fores (160 lb. to 220 lb.) ...	2 $\frac{5}{8}$ d.	2 $\frac{5}{8}$ d.
Ox, hinds (160 lb. to 220 lb.) ...	2 $\frac{7}{8}$ d.	2 $\frac{7}{8}$ d.

(All quotations for beef are nominal.)

EGGS.—French, 15s. to 18s.; Danish, 9s. 6d. to 16s. per 120.

BACON.—Irish, 48s. to 56s.; American, 38s. to 45s. per cwt.; Canadian, 48s. to 50s. per cwt.

HAMS.—Irish, 78s. to 108s.; American, 37s. to 38s. per cwt.

TALLOW.—Mutton, fine, 29s.; medium, 27s. per cwt.; beef, fine, 27s. 6d.; medium, 26s. 6d. per cwt.

Agricultural Patents.

PATENTS ACCEPTED.

7359: Samuel Edward Denniston, of Fox street, Avenal, near Invercargill. Otago, New Zealand, engineer. "Improved Apparatus for Dipping Sheep, and the like operations." Dated 6th July, 1903.

7444: Andrew James Fiske, of 241 Queen street, Melbourne, Victoria, Australia, livery-stable keeper. "An Improved Means of Fastening on Horse and Cattle Rugs." Dated 28th August, 1903.

7485: John Newsome Clapham, hairdresser, and George Spencer Clapham, school teacher, both of Ashurst, New Zealand. "A Device for Preventing a Horse from Running Away with a Vehicle when Unattended." Dated 21st September, 1903.

7504: Edmund Johnstone Wilson, of Jeetho, Victoria, Australia, grazier. "Improvements in Reversible Ploughs." Dated 10th October, 1903.

Times of Sunrise and Sunset, 1904.

DATE.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		PHASES OF THE MOON.
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	
1	4:57	6:45	5:21	6:42	5:42	6:19	5:58	5:46	3 Jan. ○ Full Moon 3 47 p.m.
2	4:58	6:46	5:22	6:42	5:42	6:18	5:59	5:45	10 " ☾ Last Quarter 7 10 a.m.
3	4:58	6:46	5:22	6:42	5:43	6:17	6:0	5:44	18 " ● New Moon 1 46 "
4	4:59	6:46	5:23	6:41	5:44	6:16	6:0	5:43	26 " ☽ First Quarter 6 41 "
5	5:0	6:46	5:24	6:40	5:44	6:15	6:0	5:42	
6	5:0	6:46	5:24	6:40	5:44	6:14	6:1	5:40	
7	5:1	6:47	5:25	6:39	5:45	6:13	6:1	5:39	2 Feb. ○ Full Moon 2 33 a.m.
8	5:2	6:47	5:26	6:38	5:45	6:12	6:1	5:38	8 " ☾ Last Quarter 7 56 p.m.
9	5:3	6:47	5:27	6:37	5:46	6:11	6:2	5:37	
10	5:3	6:47	5:28	6:36	5:47	6:10	6:2	5:36	16 " ● New Moon 9 4 "
11	5:4	6:47	5:29	6:35	5:47	6:9	6:3	5:35	24 " ☽ First Quarter 9 8 "
12	5:4	6:48	5:29	6:35	5:48	6:8	6:4	5:34	
13	5:5	6:47	5:30	6:34	5:49	6:7	6:4	5:33	
14	5:6	6:47	5:30	6:34	5:50	6:6	6:5	5:32	2 Mar. ○ Full Moon 0 48 p.m.
15	5:7	6:47	5:31	6:33	5:50	6:4	6:5	5:31	9 " ☾ Last Quarter 11 0 "
16	5:8	6:47	5:32	6:32	5:51	6:3	6:6	5:30	17 " ● New Moon 3 39 "
17	5:9	6:46	5:32	6:32	5:51	6:2	6:7	5:29	25 " ☽ First Quarter 7 36 a.m.
18	5:10	6:46	5:33	6:31	5:51	6:1	6:7	5:28	31 " ○ Full Moon 10 44 p.m.
19	5:11	6:46	5:34	6:30	5:52	6:0	6:7	5:27	
20	5:11	6:46	5:35	6:29	5:52	5:59	6:8	5:26	
21	5:12	6:46	5:35	6:28	5:52	5:58	6:9	5:25	8 April ☾ Last Quarter 3 53 a.m.
22	5:12	6:46	5:36	6:27	5:53	5:57	6:9	5:24	16 " ● New Moon 7 53 "
23	5:13	6:46	5:37	6:26	5:54	5:56	6:10	5:23	23 " ☽ First Quarter 2 54 p.m.
24	5:14	6:45	5:38	6:25	5:54	5:55	6:10	5:22	30 " ○ Full Moon 8 36 a.m.
25	5:15	6:45	5:39	6:24	5:55	5:54	6:11	5:21	
26	5:16	6:44	5:40	6:23	5:55	5:53	6:11	5:21	
27	5:17	6:44	5:40	6:22	5:55	5:52	6:12	5:20	
28	5:18	6:44	5:41	6:21	5:56	5:50	6:12	5:19	
29	5:19	6:43	5:41	6:20	5:57	5:49	6:13	5:18	
30	5:19	6:43	...	...	5:57	5:48	6:13	5:17	
31	5:20	6:42	...	...	5:58	5:47	...	...

The approximate times for sunrise and sunset at Rockhampton, Townsville, and Cooktown may be obtained by using the 'able for Brisbane, and adding the following figures:—

	1904.	ROCKHAMPTON.		TOWNSVILLE.		COOKTOWN.	
		Rise.	Set.	Rise.	Set.	Rise.	Set.
January	...	18 m.	2 m.	42 m.	12 m.	53 m.	9 m.
February	...	15 m.	5 m.	36 m.	18 m.	44 m.	18 m.
March 1 to 20	...	11 m.	9 m.	29 m.	25 m.	35 m.	27 m.
" 21 to 31	...	9 m.	11 m.	28 m.	26 m.	29 m.	33 m.
April	..	7 m.	13 m.	20 m.	34 m.	21 m.	41 m.

General Notes.

WORDS IN THE ENGLISH LANGUAGE.

The German language contains about 500,000 words. The English language does not contain so many, because our language does not adapt itself to compound words so easily as does the German. For instance, when a telegraphic name was required for a German river steamship company, English and French and German were tried. The English name of the company required 6 words, the French 12, but the German, turning all words but the final into conjunctive adjectives, settled the matter with one word, which read:—"Rhein-Neckar-Dampfschiff-fahrt-gesellschaft." It would surprise many people to know how few words are required for the purpose of carrying on an ordinary conversation in English. Shakespeare, who had the richest vocabulary used by any Englishman, employed only 16,000 words. Milton had a choice of 8,000 words, but the average man, a graduate of one of the great universities, rarely has a vocabulary of more than 3,000 or 4,000 words. The ordinary person can get along very comfortably with 500 words, and in the rural districts a knowledge of 200 words is sufficient to carry a man through his life. This, of course, refers to the needs of conversation. If a man wants to read newspapers, and well-written books, he must know at least 2,000 words.

NEW RULES FOR PLOUGHING MATCHES.

The annual ploughing match of the Mouswald Ploughing Association took place on the farm of Boghead, near Racks Station. For many years ploughing matches have been conducted on pretty much the same general lines, but this year the Mouswald Association, with its usual enterprise, departed from the beaten track, and struck out in an entirely new direction. The innovation was a decided novelty, and understood to be the first of the kind ever attempted; and, considering the success which has attended the venture, it is not unlikely that the new departure will become universal, having, as it certainly has, many features to recommend it to farmers. In recent years, in addition to the class for the swing ploughs, which have for long been in use, there have been provided nine different classes for the wheeled or digger ploughs, which are so extensively used nowadays in the ploughing of land out of grass. On this occasion both classes of ploughs competed against each other. An important point in the competition was that the whole area turned over by each plough had to be gathered, there being no hinting; but perhaps the most outstanding feature was that the judging was done by points—100 points being the standard for a complete rig. The competitor who turned over the land at the rate of 1 acre for ten hours was entitled to 50 points—that is, one-half of the whole. One point was taken off for every quarter of an hour over ten hours. In other words, a ploughman who was found to plough at the rate of 1 acre, say, in twelve hours, only got 42 points for time. No extra time was allowed for ploughing more than 1 acre in the ten hours, although anyone exceeding the rate of 1 acre in sixteen hours was disqualified as a competitor, and it was stipulated that no furrow was to exceed 9 inches in width, and slovenly or careless work was to be visited with disqualification. The remaining 50 points were given for quality in the following manner:—(1) 10 points for the best crown of eight furrows; (2) 20 points for the best seed-bed; (3) 10 points for straightest ploughing; (4) 5 points for outs and ins; and (5) 5 points for general excellence.—*Scottish Farmer*.

TO MEND CRACKED CROCKERY.

We have seen the following method recommended in one of the rural journals:—Put two or three pieces of loaf sugar into the cracked vessel with one-third of a tumbler of water; then place it on a very brisk fire. Spread the syrupy liquid over the cracks. The melted sugar will ooze through the cracks and soon grow hard, completely stopping the fissures. Vessels employed for cooking food can be mended in this manner. The burnt sugar does not impart any unpleasant flavour to the food cooked in a vessel thus mended.

COTTON-GROWING IN QUEENSLAND.

The *Scottish Farmer* states that it was no uncommon thing, when cotton formed one of the staple interests of Southern Queensland, to see “heavily laden bullock drays coming into Brisbane attended by *red-shirted and red-capped South Sea Islanders!*” The italics are ours. Kanakas driving bullock drays down Queen street must have been a sight strange enough to turn out the whole population to witness it.

VALUABLE TO VIGNERONS.

Monsieur Mazure, manager of the Auldana vineyards (South Australia), is the inventor of a patent bird-scarer, which is likely to be largely used in future. The charm of this device, which is a clever and ingenious one, is its simplicity, and it is sure to become popular with vigneron. The scarer consists of an ordinary kerosene tin, inside of which marbles are placed, and it is attached to a star frame, which revolves on the same principle as a wind-mill. So sensitive is the mechanism that the slightest breeze will set the scarer in motion. Mr. Mazure has thirty machines in use in the vineyards at Auldana, and he claims for them that they have been the means of saving many tons of grapes during the season. The marbles rolling within the tin cause a considerable noise, while the reflection of the sun on the revolving machine helps to frighten away, not only birds, but also rabbits and hares.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

Answers to Correspondents.

WATERPROOFING CANVAS.

Some weeks ago we were asked by a correspondent to give a recipe for waterproofing canvas, and made some reference to railway tarpaulins. The question was referred to an expert in such matters, and was mislaid by him. However, perhaps our correspondent will see and try the following:—

Into one gallon of rain water stir 1 oz. of sugar of lead and 1 oz. of powdered alum until they are quite dissolved. Let it stand till the sediment falls, pour off the water and lay the sheet in it for twenty-four hours. This liquid will render ordinary cloth rainproof. If an oil-sheet is no longer water-proof, give it a good coating of a dubbing made by melting 1 part of mutton suet and 2 parts of beeswax. When these are thoroughly mixed, apply with a piece of rag.

HAND REFRIGERATING MACHINE.

DAIRYMAN, Helidon.—We learn, on inquiry from importers of refrigerating machinery, that no such small machine as you mention is obtainable in the State. The demand is entirely for large steam-driven machines.

SISAL HEMP.

SISAL HEMP, Nikenbah.—

1. The pole plant you enclose is, we are informed by Mr. F. M. Bailey, Colonial Botanist, the *Agave rigida*, probably var. *elongata*, which has leaves of a greyish-green colour, with thorny spines on the edges of the leaves. It is difficult to say, from the specimen, whether it is the var. *sisalana*. If the latter, the leaves will be of a dark-green colour, with no or at least very few spines. The *A. elongata* furnishes excellent marketable fibre.

2. The sample of hemp you allude to was obtained in the primitive way of scraping the leaves with a hoe. It was done by the authorities at St. Helena. We cannot give you any idea of the cost. It is probable that before long a machine will be introduced here called the "Raspador," costing about £30, which will turn out 333 lb. of clean, dry fibre in ten hours. It will treat 6,000 leaves in that time. A 6-horse power engine and the labour of two men are required. The cost of production by the "Raspador" is about 1d. per lb. A "Death and Ellwood" machine, capable of dealing with 100 acres of plants, costs in England £24.

3. Your plants will not be fit to cut for three years after planting, which will allow plenty of time in which to get machinery.

4. The first twelve months' issue of the *Journal* may be obtained on application to the Department of Agriculture.

NON-DELIVERY OF THE JOURNAL.

N. W. LOGAN, Yeppoon.—We again call the attention of correspondents to a standing notice in "Public Announcements" in each number of the *Journal*, to the effect that all communications referring to the despatch of the *Journal* and all letters containing remittances should be addressed to the Under Secretary, and not to the Editor.

MILKING MACHINE.

A.E., Upper Pilton.—The milking machine you mention has not yet found its way to Australia. The best way to ascertain its value would be to write to the Editor, *Farmer and Stockbreeder*, London.

BANANAS NOT MATURING.

CONSTANT READER, Nambour.—The cause of bananas not maturing and losing colour is explained by Mr. S. C. Voller, Assistant Instructor in Fruit Culture, to be the result of extra strong growth. He advises cutting the bunches before they get too far towards maturity. The trouble will, however, disappear before long, as it has been known to have occurred in past times in other places.

PLANTING OUT CAULIFLOWERS.

MARKET SEEKER, Toowoomba.—We have not yet been able to ascertain whether the cabbage-planter you allude to has yet reached Australia. Why not write to the Master's Planter Company, 174 South Water street, Chicago, U.S.A., or to the Editor, *Californian Fruit Grower*, San Francisco? The company brought out the implement in 1901. With it, all back-aching work is avoided. It is claimed for it that it will enable a man to set out from 7,000 to 10,000 plants in a day. The state of the weather need not be considered, as the plants are set in water and covered with soil at one operation.

The Markets.

PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	FEBRUARY.	
	Prices.	
Apples, Eating, per packer	2s. to 6s.	
Apples, Tasmanian, Cooking, per case	8s.	
Apples, Tasmanian, Eating, per case	4s. 6d. to 7s.	
Apples, American, Green ... ..	...
Lemons, Italian, per 150 to 180 ... ..	...
Lemons, Italian, per 150 to 180	10s.	
Lemons, American, per 180	7s. to 8s.	
Lemons, New South Wales, per case	5s.	
Oranges, Italian, per 180 ... ..	...
Oranges, Local, per case ... ..	...
Oranges, Sydney (packers), per case ... ..	...
Mandarins, Local (indifferent) ... ..	...
Mandarins, Sydney (packers) ... ..	...
Apricots, New South Wales, boxes (half-gincase)	1s. 6d. to 4s.	
Apricots, Queensland, half-case	1s. 6d. to 3s.	
Plums, half-gincase	2s. to 3s. 6d.	
Peaches, half-gincase	1s. 6d. to 3s. 6d.	
Nectarines, half-gincase	4s.	
Gooseberries, English, per quarter-case ... ..	...
Cherries, per quarter-case ... ..	...
Passion Fruit, quarter-case	1s.	
Mangoes, per case	4s.	
Pineapples, rough, per dozen	3d. to 8d.	
Pineapples, Queen	6d. to 1s. 3d.	
Melons, per dozen	2s. to 5s.	
Rockmelons	2s. 6d.	
Bananas, per bunch	1s. 6d.	
Bananas, per dozen	2½d.	
Tomatoes, quarter-case	4d. to 1s.	
Papaw Apples, quarter-case	1s. 6d.	
Custard Apples, quarter-case ... ..	...
Granadillas, case ... ..	...
Seville Oranges, apple-case ... ..	...
Cape Gooseberries, per quart ... ..	...
Pears (Melbourne), export case	8s. 6d.	
Pears (Tasmanian), quarter-case	3s. 6d.	
Pears (China), Local, per case ... ..	...
Rosellas, per sugar-bag ... ..	...

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR FEBRUARY.

Article.	FEBRUARY.	
	Prices.	
Bacon (Pineapple)	lb.	7½d. to 8½d.
Barley (Malting)	bush.	2s. 6d. to 3s.
Bran	ton	£2 15s. to £3 15s.
Butter, Factory	lb.	7d. to 8½d.
Chaff, Mixed	ton	£1 15s. to £2 15s.

**PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR
FEBRUARY—continued.**

Article.							FEBRUARY.
							Prices.
Chaff, Oaten ... ..	...	...	...	...	...	ton	£2 6s. 8d. to £3 17s. 6d.
Chaff, Lucerne ... ..	...	...	...	...	...	"	£1 13s. 4d. to £2 15s.
Chaff, Wheaten ... ..	...	...	...	...	...	"	£1 to £2 11s. 8d.
Cheese ... ..	...	...	...	...	...	lb.	5½d. to 6d.
Flour ... ..	...	...	...	...	...	ton	£7 10s. to £9
Hay, Oaten ... ..	...	...	...	...	...	"	£5 to £5 7s. 6d.
Hay, Lucerne ... ..	...	...	...	...	...	"	£1 to £1 15s.
Honey ... ..	...	...	...	...	...	lb.	1½d. to 1¾d.
Maize ... ..	...	...	...	...	...	bush.	1s. 8d. to 2s. 6d.
Oats (Victorian) ... ..	...	...	...	...	...	"	2s. 7d. to 2s. 9d.
Pollard ... ..	...	...	...	...	...	ton	£3 10s. to £4
Potatoes ... ..	...	...	...	...	...	"	£2 5s. to £3 12s. 6d.
Potatoes, Sweet ... ..	...	...	...	...	...	cwt.	£1 10s. to £1 19s. 2d.
Pumpkins ... ..	...	...	...	...	...	ton	£1 to £1 15s.
Wheat, Milling ... ..	...	...	...	...	...	bush.	2s. 8d. to 3s. 2d.
Wheat, Chick ... ..	...	...	...	...	...	"	2s. 2d. to 3s.
Onions ... ..	...	...	...	...	...	ton	£3 to £5
Hams ... ..	...	...	...	...	...	lb.	1s. to 1s. 1d.
Eggs ... ..	...	...	...	...	...	doz.	8d. to 1s. 4½d.
Fowls ... ..	...	...	...	...	...	pair	2s. 6d. to 5s.
Geese ... ..	...	...	...	...	...	"	4s. 3d. to 5s. 6d.
Ducks, English ... ..	...	...	...	...	...	"	2s. 7d. to 3s. 7d.
Ducks, Muscovy ... ..	...	...	...	...	...	"	3s. 6d. to 5s. 6d.
Turkeys, Hens ... ..	...	...	...	...	...	"	6s. 3d. to 7s. 6d.
Turkeys, Gobblers ... ..	...	...	...	...	...	"	9s. 6d. to 11s.

ENOGERA SALES.

Article.						DECEMBER.	JANUARY.
						Prices.	Prices.
						£ s. d.	
Bullocks ... ..	...	...	...	...	...	11 0 0	£9 to £11 2s. 6d.
Cows ... ..	...	...	...	...	...	9 0 0	£7 to £7 10s.
Wethers, Merino ... ..	...	...	...	...	...	0 19 0	18s. to £1 2s. 6d.
Ewes, Merino ... ..	...	...	...	...	...	...	to 12s. 9d.
Wethers, C.B. ... ..	...	...	...	...	...	1 5 0	18s. to £1
Ewes, C.B. ... ..	...	...	...	...	...	0 18 9	17s. to 17s. 9d.
Lambs ... ..	...	...	...	...	...	0 18 0	14s. 6d. to 15s. 3d.
Pigs ... ..	...	...	...	...	...	...	Nil

Orchard Notes for March.

By ALBERT H. BENSON.

By the end of February the marketing of deciduous fruits is practically finished in Queensland, as, with the exception of a few varieties of late apples in the Stanthorpe district, and of persimmons in the various parts of the colony, this season is over.

The finish of the deciduous fruits, however, marks the commencement of the citrus season, and these fruits will be ready for handling in the earlier districts of the State during the month. This being the case, I take this opportunity of calling the attention of all citrus-growers to the following very important considerations:—

FIRST: *The necessity for preventing this fruit from being destroyed by pests.*

In addition to the various scale insects attacking citrus-trees and citrus fruits, the ripening fruit is liable to be destroyed by insects that either suck the fruit, such as the orange-piercing moths described by Mr. Tryon in the April number of this *Journal* for 1898; or by insects boring into the fruit, such as the yellow pearl moth, sometimes known as the corn moth or borer moth, and the fruit fly. In order to obtain a good crop of marketable citrus fruit, these three pests must be carefully looked after, and every possible means must be taken to keep them in check so as to reduce the damage caused by them as much as possible. The orange-piercing moths can be destroyed in large numbers by the use of poisoned baits consisting of well-ripened Cavendish bananas impregnated with a solution of arsenite of soda, or a soluble arsenical poison, such as the well-known white-ant exterminators. These poisoned baits should be hung up among the orange-trees, and they will attract and destroy large numbers of the moths. Ripe Cavendish bananas, unpoisoned, also act as an attraction to the moths, and they may be caught by means of an ordinary butterfly-net when sucking the fruit at night. The yellow peach moth, the second of these pests, is much more difficult to deal with, as it is not easily attracted or captured. It lays an egg on the skin of the fruit, usually where two fruits touch, or else in the folds of the skin, near the stem—in fact, in positions where it is not likely to be rubbed off. The egg hatches out into a minute caterpillar, which eats its way into the fruit, and increases in size till it is fully an inch long. Green fruits attacked by this insect rapidly turn yellow, and usually fall off, the loss in some instances being considerable, as the pierced fruit is useless, and rots rapidly. There are two remedies—first, the destruction of the young caterpillar as soon as it has hatched from the egg and before it has eaten its way into the fruit, and the second remedy is by the gathering and destruction of all fruits and seeds harbouring either the larvæ or pupæ of the insect. The destruction by the Paris green or arsenate of lime is described in the October number of this *Journal* for 1900 under the article on citrus culture. The arsenical spray must be put on in the finest possible form so as to completely cover all the fruit on the tree, so that when the young caterpillar starts to eat the skin of the fruit it will eat a minute quantity of arsenic and be poisoned. This remedy has proved very effectual in the treatment of the codlin moth which attacks pomaceous fruits, and there is no reason why it should not be equally efficacious in the case of this insect as well. One spraying will not be sufficient, as the moths continue to lay their eggs for a considerable time, so that in districts where this moth is especially destructive to citrus fruits spraying should be repeated at intervals of not less than three weeks.

The last and by far and away the most destructive insect is the fruit fly. It attacks the orange whilst still quite green, and, although the eggs seldom hatch out when laid in the unripe fruit, the injury to the latter caused by the puncture of the ovipositor of the fly tends to a premature ripening of the fruit and to its falling from the tree. Kumquats are especially liable to be attacked by the fly, and often form a very good trap for it, as, if the tree is carefully watched and all infested fruit is gathered and destroyed, a large number of larvæ which would otherwise hatch out and destroy a quantity of fruit would be prevented from so doing. As stated over and over again in these notes and in the articles on fruit culture appearing in this *Journal*, there is no better remedy for the fruit fly than the destruction of infested fruit, and the removal from the citrus orchard of all worthless and unprofitable fruit trees of all kinds which tend to harbour and breed these insects. Systematic and combined effort on the part of all fruitgrowers to carry out these recommendations will do more to keep this pest in check than anything else, and surely the citrus industry alone is worth taking a little trouble to save, as the quality of the fruit is recognised throughout Australia, and, it is to be hoped, will be shortly recognised in the Home markets as well.

SECOND.—The Peacock or Shoobridge case, which was accepted as the standard case at the Brisbane Fruitgrowers' Conference in 1897, and again at the Melbourne Conference in 1900, for all hard fruits, should be the only case used in which to market the fruit, as it is the only case at present in use in Australia in which it is possible to pack every grade of oranges, so as to have the fruit of even size throughout, and to have the case properly filled. Fruit, packed in this case, carried well to Vancouver, and no difficulty was experienced in packing the various sized fruits.

Strawberry planting can be continued during the month on same lines as recommended in the notes for February.

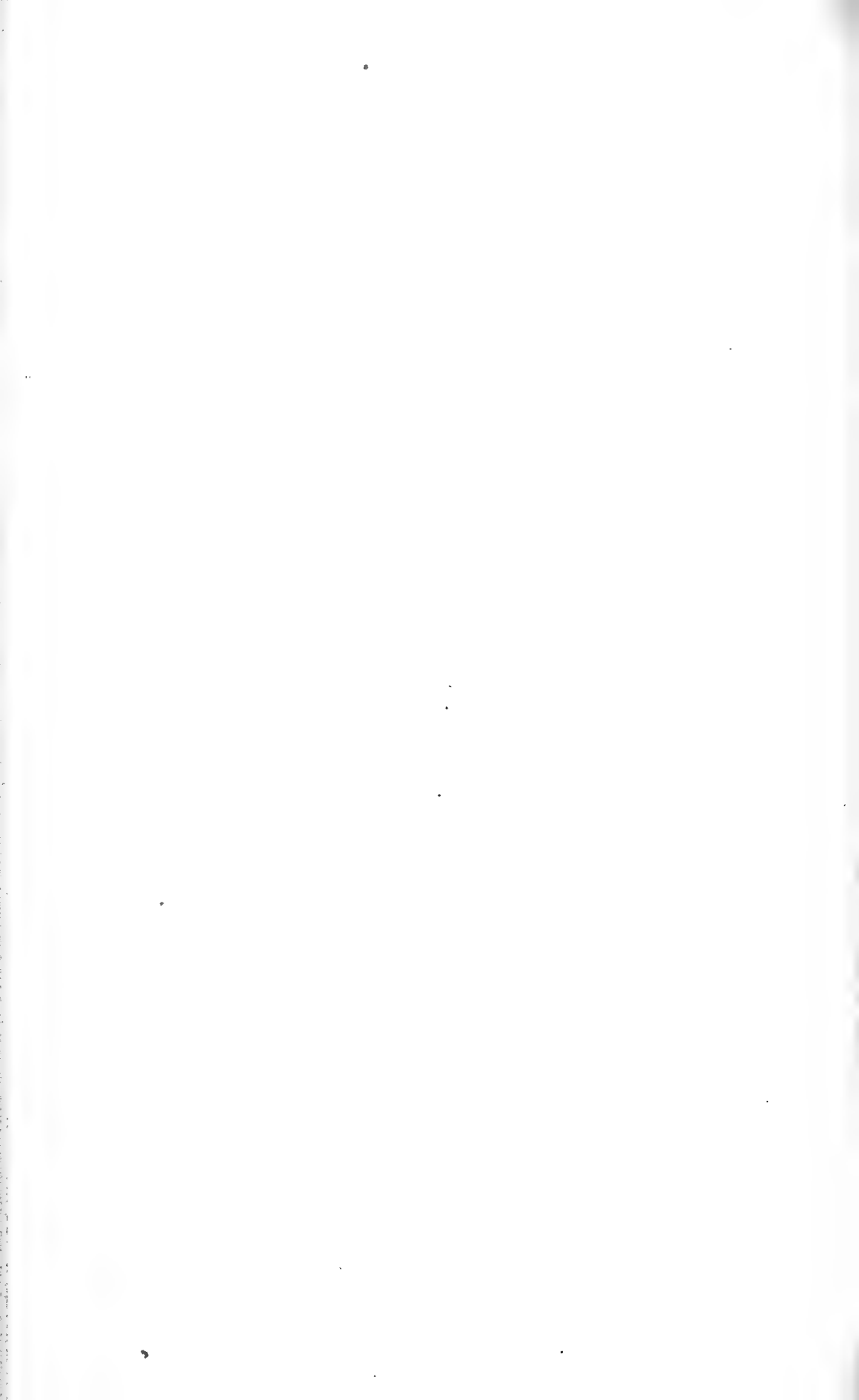
Where new orchards are to be planted, it is fully time to see about the preparation of the land, if this has not already been done, as it is advisable to get the land well sweetened before planting. Old worn-out trees, and inferior trees it is desirable to do away with, can be taken out during the month, the holes from which they have been taken being left exposed to the action of the air, so as to be thoroughly sweetened by the time a fresh tree is planted in the same place. Keep the soil well worked, and where weeds have got the upper hand during the previous month mow them down, and turn them under with the plough, a plough having a short digging mouldboard being the best for this purpose.

Farm and Garden Notes for April.

FIELD.—The maize crop should now all be harvested. Gather sorghum seed as it ripens. The main potato crop sown in February and March will be ready for earthing up a first or a second time. Cut and house tobacco as it comes to maturity. Sow lucerne, and keep thoroughly clean what was sown last month. Sow oats, barley, rye, vetches, mangels, and swede turnips. April, May, and June are the months for sowing early and late wheat. Whatever variety is sown should be dipped in a solution of bluestone (sulphate of copper) at the rate of 1 lb. bluestone to 24 gallons of water. The hot-water treatment, as previously described in this *Journal*, is effective in destroying germs of smut and similar fungoid diseases. Do not sow too thickly. About half a bushel to the acre is sufficient—more on poor land, and less on rich soils where the wheat is inclined to stool. On light, sandy soil the wheat should be rolled. On sticky land be cautious and roll only when the land is dry. Otherwise it will cake, and must be harrowed again after rolling. When the wheat is 6 inches high, go over it with light harrows. If the autumn and winter should prove mild, and the wheat should lodge, it should be kept in check by feeding it off with sheep. Any land not ready for wheat should be got ready as soon as possible. Those who are already growing cotton will require to give the crop attention, as the pods will now be bursting. Picking should be done as soon as the dew has dried off—not before. Transplant roots of *Paspalum dilatatum*.

KITCHEN GARDEN.—Keep the weeds down amongst the crops, and prepare well-dug, well-manured beds for transplanting the various vegetables now coming on. Thin out all over-crowded crops. Divide and plant out pot-herbs, giving a little water, if required, until established, after which be more sparing in the use of water. Sow broad beans, peas, onions, radishes, mustard, cress, and all vegetable seeds generally. In dry weather, earth up celery, being careful to prevent the soil getting between the leaves. Hold the leaves in one hand and earth up with the other. Fill up occasionally, and your celery will be ready in about two months. Transplant cauliflowers and cabbages. Keep on hand a supply of tobacco waste, preferably in the form of powder. When slugs appear, place a ring of this round your plants, and they will be then as impregnable to the slug as the strongest fortification to an attacking force. Also, water occasionally with a solution of one part decoction of tobacco to ten parts of water. As an instance of the efficacy of dry tobacco leaf stems, the following will be ample proof:—An amateur vegetable-grower, finding that in December last the great vaginula slug had begun to make nocturnal attacks on his young cabbages, obtained a quantity of leaf stems, and placed them round each plant. Next morning there were three large black slugs lying dead about a foot from the plant, and another had just reached the nearest plant stalk when death interrupted the meal almost begun.

FLOWER GARDEN.—Work early and late to keep down weed-growth. Sow all the annuals recommended for last month, and you will find the seedlings come in very handy later on. Those already up will keep you busy pricking them out into other beds or into their permanent positions. Growth will not be too luxuriant just now, and shrubs and creepers may be shortened back. Plant out shrubs of all sorts in well-drained spots. Do not dig pot-holes, in which the first good rains will form stagnant pools. Always dig your flower beds rough at first, then apply manure, dig it in, and after this get the soil into fine tilth. Land on which you wish to raise really choice flowers or vegetables should have a dressing of bonemeal lightly turned in. Wood ashes also form excellent dressing for the garden soil. Prune out your roses. Whatever you may be told to the contrary, roses, if well-grown and hard, may be planted out now with perfect success. Take up dahlia roots and plant bulbs, as recommended for March.



Agriculture.

ROOT CROPS.

MANGEL WURZEL AND SUGAR-BEET GROWING.

By G. B. BROOKS, Manager, State Farm, Biggenden.

Many of the farmers who visited the Biggenden State Farm during the past season were greatly interested in a crop of mangels and sugar-beet. From the inquiries made as to procuring seed, time of planting, &c., there is no doubt but that small areas will shortly be found growing on many farms throughout the surrounding districts. For the benefit of those *Journal* readers who have not already grown this crop, but may wish to give it a trial, I will give a short description of the methods employed in the raising of mangels.

SOIL FOR MANGELS.

A strong, deep loam is the most suitable, but a soil that will successfully produce ordinary farm crops will grow mangels. They will also do well on heavy clays, providing the drainage is good. The soil on which the crop grown on this farm was raised was of a stiff clay in texture, as the following extract from an analysis made of the farm soils will show:—

Mechanical Analysis.—

Stones over 5 mm. diameter	...	...	.20
Gravel over 2 mm. diameter	...	...	1.00
Sand	...	...	5.10
Fine sand	...	...	16.91
Clay	...	...	58.22
Organic matter and moisture	...	...	18.57

Chemical Analysis.—

Total nitrogen	...	...	.140
Sol. silica	...	...	.224
Sulphuric acid	...	...	.049
Phosphoric acid	...	...	.070
Potash	...	...	.056
Lime	...	...	1.372

The land was prepared by ploughing to a depth of 9 inches, and worked into a fairly fine state of division, so as to get as good a seed bed as possible.

MANURES.

Previous to the seed being sown, superphosphate was broadcasted and harrowed in, on two-thirds of the area to be planted, at the rate of $\frac{1}{2}$ cwt. per acre—a mere sprinkling. In growing root crops, such as mangels and turnips, it is essential that phosphoric acid be present in the soil in an available form. This is to enable the young plant to pass over as quickly as possible what may be termed the critical period—that is, until the rough leaf has been formed. Mangels, when well started, are capable of drawing their supply of phosphoric acid from the soil, and any further plant food supplied should be in the form of nitrogen, such as sulphate of ammonia, or nitrate of soda.

Under ordinary circumstances, 1 cwt. of either ought to be sufficient, applied, say, one-half after thinning out and the remainder a month later.

QUALITY, NOT QUANTITY.

Although enormous crops of mangels can be grown by judicious manuring and cultivation, still what the grower should aim at is not so much quantity as quality. For instance, very large roots will often contain as little as 6 per

cent. of dry matter, while in smaller roots the proportion may be as high as 15 per cent. Not only are the large roots less valuable for feeding purposes, but the extra cost of handling has also to be taken into consideration. For instance, you have, in every 10 tons of the 6 per cent. roots, 1 ton more water than in the case of the 15 per cent. roots.

SOWING.

It was intended to make sowings at different periods, beginning in August, but owing to the drought then prevailing this could not be carried out. The first seed was put in on 4th February, by means of the Planet Junior seed drill, in rows 3 feet apart, and at the rate of 4 lb. per acre. The ground being moist, all varieties were up by the 12th, but shortly after germination the thermometer rose to 101.5 Fahr., with the unfortunate result that some 80 per cent. of the young seedlings got burned up. Sufficient were left, however, to fill up blanks, the transplanting being carried out when the roots had attained the thickness of a lead pencil. The distance left between the plants was 18 inches.

After cultivation consisted in going through them several times with the Planet Junior, slightly hilling up when the roots had attained a fair size.

YIELD PER ACRE.

Three varieties were grown, and the yield per acre, ascertained seven months after planting, was as follows:—

Long Red—73 tons per acre, individual roots up to 38 lb. in weight.

Yellow Globe—69 tons per acre, individual roots up to 35 lb. in weight.

Long Yellow—69 tons per acre, individual roots up to 34 lb. in weight.

Several roots of the Long Yellow variety were over 3 feet long.

KEEPING QUALITIES.

In a previous experiment the roots were harvested and stored in pits. On this occasion, however, they were allowed to remain in the field, for the purpose of finding out how long they would keep good. All three sorts kept quite fresh up to the end of October, when a few of the Long Yellow showed signs of rotting or, rather, drying up. By Christmas some 10 per cent. of this variety had perished, but so far only a root here and there of the other sorts. The entire crop was taken up during the first week in February, when it was found that 50 per cent. of the Long Yellow and 5 per cent. of the Light Red and Yellow Globe were useless for feeding purposes. As to keeping qualities, the Yellow Globe proved to be the best, the flesh being quite firm when cut up. When taken up, the roots were tipped into one heap alongside the pigsties, and well covered up with straw. This was some three weeks ago, and what roots remain are still as fresh as when put there.

STORING IN PITS.

The chief points to be observed, if the crop is to be stored in pits, are, to see that the roots are dry, not topped too close to the flesh, and that they are covered up with soil sufficient to keep out the heat. Select, if possible, a cool shady position for the pit, and before putting the soil on the roots cover lightly with straw or dry grass. This will greatly facilitate matters when unearthing them. When storing large quantities, open the pit out with the plough, taking as deep a furrow as possible; shovel the soil to the sides; tip the roots in the cleared space, and when built to the height required cover with straw, and then plough up to the pit, using single horses. After two or three rounds it will be found necessary to throw the furrow on top with shovels.

A quantity stored as above on this farm kept in excellent condition during the two hottest months of the year. It is difficult to say how long they would have kept good, as they had to be taken up on account of the ground on which the pit stood being required for other purposes.

Another method of storing is to pile the roots against the wall of a shed, &c.—on the shady side—and thatch heavily with straw, of course giving sufficient pitch to ensure the water running off.

AS A FOOD FOR STOCK.

The greater portion of the crop has been fed to pigs, and although not a well-balanced ration in itself, still it proved, when used in conjunction with maize and barley, a very valuable adjunct.

It will be found that if supplied to the milking herd when the pasture gets a bit dry the milk flow will be considerably increased. They are also relished by working horses. A few feeds a week will keep them healthy and give a glossy coat.

SUGAR-BEET (Vilmorin's Improved).

A small area of sugar-beet was sown at the same time and under the same conditions as the mangels. The rows in this instance were 30 inches apart, and the distance between the plants 12 inches. This crop, although not yielding anything like the same tonnage per acre as the mangel, is, nevertheless, in many respects, the better crop of the two. While the mangel root is mostly formed on the surface of the ground, the greater portion of the beet is buried in the soil, and, in consequence, not so liable to get scalded or softened by the sun. It is also the better stock feed, containing less water and more feeding material. If both roots are supplied to pigs, they will invariably dispose of the beets first, this preference no doubt being on account of their sweetness.

RETURNS PER ACRE.

The return per acre was exceptionally large for beets, being 34 tons. Many individual roots went as high as 14 lb. When grown for sugar manufacture the plants are grown much closer together than was the case in this experiment, the rows being some 16 inches apart, with 8 inches between the plants. The smaller the roots the richer the sugar content, and *vice versa*. The weight of root aimed at is from 1½ to 2½ lb.

TRANSPLANTING.

Although the beet is easily transplanted, still a good deal of care has to be exercised in not breaking the tap root. Should this happen, the result will invariably be forked roots, to which the soil will adhere when harvesting. Either left in the field or stored in a pit, their keeping qualities are, if anything, better than those of the mangel.

Another experiment is in progress to determine whether it will be possible to successfully grow mangels or sugar-beet during the hot summer months, so as to become available for feed in the winter when most required. It is too early yet to state what the result will be. Details will, however, appear in the *Journal* at a later date.

[Mr. Brooks sent some excellent negatives of the crops for reproduction in the *Journal*, but these were all destroyed by stamping at the Post Office, although a special tag was affixed to avoid the necessity for stamping the negatives.—Ed. Q.A.J.]

BROOM MILLET.

By A. J. BOYD.

The demand for the particular variety of sorghum called "broom millet" cannot be said to be unlimited. Yet, in so far as a local demand exists in Brisbane for broom-making, it should be noted that the demand is far greater than the supply. The broom manufacturers have never been able to obtain sufficient for their requirements from farmers within the State, and hence have been obliged to import largely from America and from New South Wales.

In the year 1901, there were 81 acres sown with broom millet, which yielded 50,476 lb. of fibre. The largest areas were planted at Toowoomba (30 acres), Dugandan (22 acres), Logan (14 acres), the balance being distributed between Brisbane, Goodna, and Laidley.

In 1902 little more than half the above area was sown at but three centres—Logan, Dugandan, and Laidley—the resulting product being only 16,742 lb. of fibre.

The average yield per acre varied in a remarkable degree. Thus, whilst the average return at South Brisbane for 1901 was 1,120 lb. per acre and at Dugandan 849 lb., the yield at Goodna was but 336 lb., at Laidley 560 lb., and at Logan 631 lb. In 1902 the returns were still less encouraging, except on the Logan (667 lb.), and at Gatton (560 lb.). Dugandan only gave a return of 250 lb. per acre, and Laidley 299 lb.

Now, in those two years, the quantity of broom millet manufactured into brooms was as follows:—

		lb.		Queensland grown. lb.		Grown elsewhere. lb.
1901	...	139,440	...	34,720	...	104,720
1902	...	172,127	...	34,828	...	137,299

So that in 1901 millet grown in Queensland comprised 25 per cent., and in 1902, 20 per cent., of the raw material utilised. The balance of requirements had therefore to be imported, and the imports for 1901 were 107,120 lb., and for 1902 142,200 lb. The whole of this came from New South Wales. Why should all the fibre needed for broom-manufacture in Queensland not be grown within the State? The natural inference is, either that broom millet is not a paying crop or that other crops are more profitable. To decide the question, let us consider the cost of cultivation, the price of the finished product, and the suitability of soil and climate for the production of a good marketable commodity; and, lastly, what variety is the best for commercial purposes.

Taking the last item first, there are two varieties which rank amongst the best. These are the Californian Golden and the Improved Evergreen. Mr. Daniel Jones, of the Queensland Department of Agriculture, who made broom millet cultivation and the manufacture of brooms a special study, says that both yield satisfactory results, but of the two varieties he prefers the Californian Golden, as it is a good vigorous grower, with a firm, upstanding brush. It cures to a good bright colour, makes a satisfactory hurl, and is not so prone to grow crooked in the brush as some varieties. As the brush clears itself freely from the sheath, it does not afford much harbour for the aphid, which leaves those red markings on the hurl which are so disliked by the broom-manufacturers.

The Improved Evergreen is not so luxuriant a cropper as the Californian Golden, but it has the advantage of not being likely to throw so much crooked brush, and, therefore, needs less attention in bending. The more enduring green colour of the brush is greatly approved of by some manufacturers, especially in Sydney, where the fashion tends to green-coloured brooms, whilst in Brisbane and Melbourne the light-coloured brooms are preferred.

A new variety has been introduced in Queensland and New South Wales, called the White Italian. This has proved the heaviest yielder, and when properly cultivated and cured possesses all the advantages of the two above-mentioned kinds. But it has its demerit in that it persistently bears crooked broom-heads. Crooked brush means defective quality, lower price, much care and trouble in cleaning, sorting, packing, &c. Still, by attention to the crop in bending, the crookedness may be overcome.

CULTIVATION.

Any land which will produce a good crop of maize will grow broom millet. This has been well demonstrated at the Queensland Agricultural College, where splendid broom corn (shown in the illustration), 16 feet in height, was grown on the heavy black soil usually placed under maize or lucerne. The plant also

thrives on volcanic red and black soil, and on rich gravelly loams. The land should be ploughed to a depth of 6 or 8 inches, and the soil reduced to a fine tilth. There should be good natural drainage, or, failing that, the superfluous water during wet weather should be artificially led away, for broom millet cannot thrive with stagnant water at the roots.

When the land has been thus thoroughly prepared and is quite free from weeds, the seed may be sown. This should be done in sheltered places, about the end of July—elsewhere in August and September.

As in sowing maize, a corn-marker should be used to mark out drills, from 3 feet to 3 feet 6 inches apart. A simple contrivance, which any farmer can make for himself, will mark four drills at once. The seed should then be drilled in, three or four seeds being dropped at intervals of 1 foot. This will require about 6 lb. of seed to an acre. The seed should only be covered to a depth of from $\frac{3}{4}$ inch to $1\frac{1}{2}$ inches. In a week or ten days the plants will appear, but, as they grow at this stage much slower than young maize plants, the harrow should be lightly run over the whole ground. There is no danger of the young plants being dragged out. They will soon begin to gain strength, and thenceforward grow rapidly. The horse hoe should then be regularly used until the foliage is dense enough to cover the ground. At the last hoeing, some of the soil should be thrown up against the plants.

BENDING.

The operation known as bending is needed in some cases—not always—to prevent the young broom-heads from becoming crooked at the base. This will occur where there is a very heavy crop, owing to the increasing weight of the seeds, or to the tenacity of the sheath, which prevents regular development. The operation is performed as follows:—A man passes down between two rows



and bends the heads on either side of him by pressing them over his arm, or by seizing the head between his finger and thumb and turning the stalk down, in a manner not to break it. This work should be done when the blossom begins to fall, or when the seed is just formed. The effect will be to straighten the fibre, and to make it tougher, and also handier for cutting. It also prevents the fibre from becoming too coarse. What is wanted is a straight, fine fibre. Care must be taken with short plants not to allow the bent head to approach the ground nearer than 6 or 8 inches. If the seed be allowed to ripen, the fibre will not be so valuable as if it is cut before the ripening. But some farmers may wish to save the seed, and on that account would be willing to sacrifice something in the price of the fibre. It should always be borne in mind that crooked brush is not of so much value as that which is straight, and hence soil, cultivation, distance between rows and plants, time of planting must all be taken into consideration.

CUTTING.

When should the harvesting of the crop begin? As soon as the heads have been bent, it is immaterial; indeed, if the object be to obtain green hurl, the cutting may be begun almost directly after bending. Should the weather be dry and only a small patch is grown, it is well to let the brush hang until it is cured. In any case, the brush must not be exposed to continuous wet, or it will be discoloured. When cut in the young stage, the heads must not be piled up in heaps, or they will sweat and lose their bright colour. If, on the other hand, the fibre is matured, no such care is needed, and should the weather be fine, the heads may be left in the field for a day or two to help forward the curing. The least length of broom-head which should be cut is about 6 inches. The fibre will often run to a length of over 2 feet, but such a length is not so marketable as a length of about 20 inches. When cutting short heads, a stalk should be left about 6 or 8 inches long from the base of the fibre. With long heads, a stalk about 4 or 5 inches long is enough. In any case, the leaving of a stalk is important, both for the benefit of the farmer in the matter of weight and for the benefit of the broom-maker in that a stalk is required in building up certain classes of brooms. The stalks may be cut with a strong sheath knife or butcher's knife. The men engaged in cutting work between two rows, each cutter depositing the tops so as to have as many rows in one as convenient, placing the tops in regular order in small heaps, the tops and butts being laid one way.

SCRAPING.

By this term is meant the removal of the seed, which operation may be performed in a variety of simple ways, such as drawing the heads through a cleft stick, by using a curry comb, or by fixing saw-teeth in the end of a board, or by removing the top of a threshing machine and exposing the brush to the action of the drum.

Mr. Daniel Jones thus describes a machine he made himself which answered the purpose very well:—

If for treating immature brush, as is mostly the practice adopted by the American growers, who produce the highest-priced corn, the material must be scraped off by saw-teeth scrapers designed for the purpose. Of course, the peg drum will, to some extent, do for this class of brush; but it is a slower and harder task to remove the husks than if a properly constructed tooth-scaper is employed. In my own case I was fortunate enough in possessing an old cotton gin that in my boyhood I had often helped to feed when cotton was king in West Moreton. From the numerous narrow saws I constructed my scraper, by fastening them on to strips of inch-by-inch hardwood, and these on to a drum made from a pine log about 4 feet long. When working it by hand I put spur gear on, but usually fixed the pulley to drive by pony gear. The average farmer's ingenuity will not be heavily taxed to construct such a machine as is

needed for either of these machines. The rough framework, necessary to suspend the barrel can be easily formed from a few pieces of scantling well spiked together or, for preference, bolted on, as the vibration has a damaging effect on nails unless clinched. The speed at which the machine revolves also points to a necessity of the construction being sound. A strong guard and rest should be put up, so as to form some protection to the person holding the brush over the teeth. Sometimes, if handling crooked brush, the material will tangle in the teeth of the machine. Under such circumstances, it is better to let go rather than get a pull over the rough spikes or teeth.

In constructing the machine it is well to close the three sides up, either with bagging or boards, to prevent the dust blowing back as much as possible on the workers. Working with a drum such as I have described, giving room for two men or boys to hold the brush on, and one lad to hand up to them, the preparation can be quickly done. The cleaners, taking two handfuls of brush, press one handful down on the cylinder with the other, until clean and *vice versa*, turning the hand occasionally to ensure every part of the hold being scraped. In my own practice, I have cleaned at the rate of 40 lb. of brush per hour with one man and the machine and a boy to hand up.

Before concluding my references to cleaning the fibre, I wish to advert to a method that I sometimes used, and, as it has a bearing upon the curing of the crop, has some connection with the former subject. Under certain circumstances, it may be deemed expedient by the grower to strip the brush immediately upon cutting—that is, when the crop is not dried, but quite green. In such a case it is quite practical to do so, and with advantage in some respects. The fibre, stripped in this condition, will be much easier cured, and cured in better condition, inasmuch as the longer process of drying will be much accelerated by the absence of seed and husk on the fibre, and the whole residue much lighter and easier to handle. Where the grower cares to lose the value of his seed, this method can be used. If however, he has need of the stripped seed for stock-feeding, the matter will not be wasted. Generally speaking, unless for converting into ensilage, for which I learn it is well adapted, green material such as this cannot be kept for long, as it quickly heats and ferments, and is wasted.

CURING.

This is a very important part of the work connected with harvesting a crop of broom millet. A farmer may have a splendid crop, and afterwards ruin it by not taking care to prevent sweating, or by exposing it to the rays of the sun when curing the fibre, which makes the latter brittle, and causes it to lose colour, thus seriously affecting the quality of the material for manufacturing purposes. The fibre should be cured in the shade, and this may be effected by running up a cheap shed of bush stuff covered with palings. Sides are not essential, as all that is required is a covering to protect the heads from sun, rain, and dew, and to allow of a free current of air through the building. The internal arrangement of the curing-house consists of a series of upright posts with battens nailed to them at regular intervals from top to bottom. On these battens a number of laths are laid, and upon them the broom-heads are spread thinly. Layer after layer may thus be laid down till the whole building is full. The racks should be so arranged that the heads may be stirred occasionally. Wire-netting may be used instead of laths. If the corn is properly cured, the Evergreen kinds should preserve the characteristic green lustre after thorough drying. The Californian Golden and White Italian should have a clear, bright appearance.

YIELD.

In the United States, where the quantity raised amounts to about 25,000 tons per annum, the average yield is 600 lb. per acre or one-quarter of a ton of broom and 1,500 lb. of seed during four months. The seed weighs about 40 lb. to the bushel, making nearly 38 bushels per acre. A second or ratoon crop can be harvested three months later, and this will yield an additional 500 lb. of fibre.

The brush finds a ready market in this State at prices varying from £20 to £30 per ton, and, as it is estimated that the value of millet brooms imported into Queensland annually approximates a sum of £8,000, and that the amount paid by the Southern States for raw and manufactured articles of this class reaches, at a low estimate, £50,000 per annum, it seems clear that the industry is one which should more largely engage the attention of farmers.

From a report on this product received from the New South Wales Department of Mines and Agriculture by the Queensland Department of Agriculture, I gather that the White Italian is a very poor millet, bad in colour, and rather full of centre growth. The Evergreen, on the other hand, is reported on by Messrs. Denham Bros., to whom a consignment was sent from the State Farm at Wollongbar, New South Wales, as being the best they had seen for a long time, and so pleased was their manager with the sample that he intends to use this millet for making up the brooms that he proposes to exhibit at the Royal Agricultural Society's show in Sydney in 1904. He also strongly advised the saving of the seed for future sowing. The millet in question was sold at £21 per ton, and the yield of fibre was 13 cwt. per acre.

BALING.

The fibre must be got to market in straight and clean condition; all tangled, crooked, and discoloured samples are classed as inferior, and bring a low price. The baling, therefore, must be carefully done. The stalk of the brush must be placed at the ends of the bale, placed evenly against the side of whatever press is used—hay-press or wool-press—allowing always the tops of the corn to overlap each other in the centre of the bale in order to bind it. When short corn is being baled, it will be necessary to fill in the centre of the bale, as the short tops will not overlap sufficiently to bind it.

In conclusion, it is reckoned that one man can cultivate from 50 to 60 acres—receiving help at harvesting. The crop is not an exhausting one, brush having been grown for over twenty years on the same piece of land. Too heavy manuring should be avoided, as this injures the crop, causing it to grow coarse and brittle.

I am indebted for much contained in this little pamphlet to Mr. L. Hubbutt, of the "Kapai" Broom Corn Factory, Auckland, New Zealand, and to Mr. Daniel Jones, of the Queensland Department of Agriculture.

BROOM CORN.

In 1899 the Victorian Government gave a bonus of 5s. per cwt. for the growth and production of marketable broom millet. Prior to the land being sown, the Minister for Agriculture had to be notified of the intention to apply for the bonus, and must approve of the application. No bonus was to be paid to any individual, association, or company, for less than 10 cwt. or more than 20 tons of marketable broom corn. The question of the marketable quality of the crop was to be determined by a departmental officer after it was harvested. I am not aware whether this bonus is still paid.

SWEET-POTATO WEEVIL.

By S. C. VOLLER.

The article in the February issue of the *Journal* on "Cultivation of Sweet Potatoes" has led me to think that it may not be a bad idea to remind readers of information given some time ago concerning the sweet-potato weevil.

This pest has, in the past, done no end of damage, frequently destroying whole crops outright; and when we consider the value of the sweet potato as an article of food for both man and beast, as well as its good yielding capabilities, the loss is a very serious matter.

Three or four years ago this enemy turned up at my place, and threatened to do as much for me as it had done for others.

I got thinking and wondering what could be done to prevent attack.

I thought of a good many things, and might have tried them all, but I had not gone far before I tried sulphur, and found it a success. The best proof I can give of its success is the fact that each year since first trying it I have used it and have saved my crop. There is no difficulty about application; simply take a bucket of dry sulphur along and dust it by hand into the crowns or butts of the plants when they begin to run.

A second application might, in some cases, be necessary later on in the season. Sulphur is cheap, easily applied in this way, and I only wish a good many other pests could be beaten with as little trouble. I give the information once more in the hope that many sweet-potato growers may be helped out of a difficulty.

POTATOES FROM CUTTINGS.

A new idea concerning the cultivation of potatoes comes from the *Shrewsbury Chronicle*. It is to the effect that the English potato may be grown from cuttings from the haulm in the same manner as in the case of sweet potatoes. A Mr. Dustin of that city cut 6 inches off the stem of a potato plant, slit it up for about 1 inch, and planted it. It struck root, sent up several strong haulms, and finally produced four magnificent potatoes as well as a quantity of small ones.

As an experiment, this news is interesting; but, as a matter of practical farming, we fail to see where any advantage is to be gained, unless potatoes were planted in the ordinary way so early as to have thrown up plenty of haulms before the end of the planting season. Again, the labour involved in making and planting the cuttings would only be justified in cases where seed potatoes were very scarce and dear. It is possible, however, that by this means new varieties of potatoes might be evolved free from or immune to disease. It would be well worth anyone's while to try a small experiment in this direction.

We often wonder why it is that farmers are so averse to making experiments in the same way as do the "potato kings" of the old country, who spare neither labour, time, nor money in making experiments which have resulted in the triumphant production of such disease-proof, heavy-yielding potatoes as the Up-to-date, Evergreen, Northern Star, and Sir John Llewellyn, and which have made small fortunes for the lucky possessors of these varieties.

GOOD ROADS.

The Hon. A. J. Thynne sends us some words of wisdom from American sources on good roads. We have much pleasure in publishing the present and promised succeeding articles on this very important subject. They are entitled—

SOME PIECES OF AMERICAN GOOD ROADS WISDOM.

With good open soils and light traffic, surface drainage of the earth road is usually adequate. With close alluvial or clayey soils and medium traffic, sub-drainage must be resorted to; but with heavy traffic and narrow tires, the surface of any earth road will be completely destroyed, hence the necessity of a consolidated mass or crust of gravel or broken stone.—M. O. ELDRIDGE, Assistant Director, Public Roads Office, Washington, U.S.A.

Here is a view of a State-aid road in New Jersey, which State has now about 1,000 miles of road built under this plan. The State pays one-third of the expense, the counties one-third, and the towns and abutting property owners the balance.

Massachusetts and three other States have now enacted similar laws, and State aid is being favourably considered by the legislatures of many other States. In New Jersey and the other States just mentioned, they have now done away with the cruel injustice which places upon the farmers and property which they own the entire burden of building roads for the whole people. . . . From 100 to 125 baskets of produce now make a fair load on New Jersey stone roads; 25 baskets were a good load on the old dirt roads.—M. O. ELDRIDGE.

Mecklenburgh County has made greater progress and has built more miles of road under this system than any other county in the United States. Twelve bales of cotton can be easily drawn over the stone roads in this county, where formerly two bales made a good load. . . . Since the good roads have been built, farm lands have advanced in value from £2 10s. and £3 per acre to £15 and £20, and I notice from a recent Press despatch that the county is soon to issue another £40,000 worth of bonds to build more good roads. Why have they done this? Because it pays to do it.—M. O. ELDRIDGE.

Up to a few years ago some of the Californian convicts had been supported in comparative idleness at the expense of the taxpayers, while others had been manufacturing articles that were sold in competition with free labour. Under a new law the convicts are turning out upwards of 100,000 tons of crushed rock annually (by means of the State prison crushing plant). Much of this material has been given to the counties as the State's contribution to road improvement, while the remainder has been sold for 1s. per ton, the railroads delivering it to any part of the State for an additional 1s. per ton.—M. O. ELDRIDGE.

Water and narrow tires aid one another in destroying the roads, while, on the other hand, wide tires are road-makers. They roll and harden the surface, and every loaded wagon becomes in effect a road roller. The difference in the action of a narrow tire and a wide one is about the same as the difference between a crowbar and a tamper; the one tears up, the other packs down. By using wide tires the cost and labour of keeping roads in repair is greatly reduced. Therefore, if you want good roads, either of dirt or stone, use wide tires and induce all your neighbours to do likewise.—M. O. ELDRIDGE.

All artificial road-building *depends wholly* for its success upon *making and maintaining a solid dry foundation*, and covering this foundation with a durable *waterproof* crust or roof of broken stone. The foundation must be *solid and firm*. If it is otherwise, the *stone or gravel crust is useless*.—M. O. ELDRIDGE.

In the preparation of stone material, a crushing plant is very desirable. The plant should by all means include an elevator, revolving screens, and bins. The screen should be perforated with holes of three different sizes, the first about 1 inch in diameter, the second 2 inches, and the third 3 inches. Great care should be exercised in selecting material for stone roads. The practice of using too soft, too brittle, or rotten material on roads cannot be too severely condemned. Rock for road-building should be both hard and tough, and should by all means possess cementing qualities.

After the stones have been separated into three different sizes, those of the largest size should be spread for the foundation, and this course should be thoroughly and repeatedly rolled, enough stone dust and spawls being added to fill the voids. The second course should be of 1½-inch stone. This should be spread, sprinkled, and rolled, and upon it should be placed just enough screening to fill all voids and to leave a smooth, impervious, and uniform surface. The rolling and sprinkling should be continued until a firm smooth surface is secured. Fine stone dust and screenings are used upon the surface. They serve a three-fold purpose:—(1) They act as a cushion to protect the road from heavy traffic; (2) They make a smooth and pleasant surface; and (3) The fine particles wash in and fill all the crevices, making a watertight crust or roof which protects the substructure. The foundation of a properly constructed stone road is as dry after a heavy shower as it is after a long-continued dry spell.—M. O. ELDRIDGE.

EXTERMINATION OF PRICKLY PEAR.

From Dalby we learn that last month the Rev. Maitland Woods, accompanied by Mr. Pixley, representing Messrs. Dalgety and Co., and a reporter of the *Dalby Herald*, examined some clumps of prickly pear at Green Bank, which Mr. Woods had treated with his injected pills some little time ago. They found that the pear was so completely withered as to be easily consumed on the application of a lighted match. On Daandine Station, where similar experiments had been carried out only a month previously, the pear was found to be quite withered, and burned freely. Our information is gained from a cutting from a journal—presumably the *Dalby Herald*—which concludes by stating that Mr. Pixley, after witnessing the experiments, was quite satisfied, and immediately made offers on behalf of his firm to the Rev. Maitland Woods for the taking over and development of the machine, and for the sole agency for its sale and for that of the pills throughout New South Wales and Queensland.

CORN-GROWING.

By R. S. NEVILL.

As corn-growing may be made an extensive and important industry in Queensland, it may be well to call the attention of farmers to some important points in this connection.

The importance of well and carefully bred seed corn is not fully appreciated by many growers, and many are not sufficiently acquainted with standards to properly select from their own fields. If the ears are large and well filled and the grain sound they deem it sufficient, and that it is not so would be demonstrated by carefully examining the field and observing the great number of stalks that have no ears on them and the few that have two well-developed ones, besides the small yield at gathering time.

Corn-growing can be made profitable when comparatively low prices prevail, if well-bred or properly selected seeds of good varieties are used in planting, and *proper cultivation follows*.

In the absence of regularly bred seed, the crop may be materially improved, both as to quality and quantity, if the grower will go through the field and select his seed before gathering the full crop.

In doing this, select only rough, well-filled ears, measuring from 9 to 10½ inches in length, according to variety, 7½ to 8 inches in circumference, measured at a point one-third the distance from butt to tip, and with 18 to 22 rows of grain to the ear. Have each ear conform to a given type—that is, do not have one very tapering and another slightly so, nor one with mixed grains. If it is a yellow corn, it is advisable to select ears with deep-red cobs or, if white, perfectly white cobs, as this indicates it has maintained its original type, or has not succumbed to cross-fertilisation, and hence is more likely to reproduce itself. The wedge-shaped grains with straight edges, rows straight on cob and firmly seated, with cob not too tapering, are desirable; such are likely to give good yields. Seeds should never be planted that bear a less proportion of shelled corn to cob than 85 per cent.; 90 per cent. is the standard. Ears too long are not likely to fill well, as they fill from the butt towards the tip. The butt should be well filled out about the shank.

Select ears from large, sound, and well-developed stalks, and, when suitable ears can be found, from stalks with two ears. After gathering, the seed should be carefully looked after and kept in a dry place. The grains off the tips and butts of the ears should not be planted, but taken off to the point where the grains are properly shaped and matured.

The composition of the grain is of great importance to the feeder; if the percentage of protein is large, it becomes more valuable as a food—it is brought nearer a balanced ration, in other words—and is of great importance to feeders.

Also a large chit or germ is desirable. By examination, the farmer can determine approximately the food value of his seed.

The proportion of hard flinty part of the grain to the soft starch at the top indicates percentage of protein and starch, and the size of the germ indicates the approximate proportion of oil.

Therefore, in selecting seed, it is a good plan to select ears having hard, flinty grains with good-sized chit. Such corn has a good constitution, and will improve each year by this careful selection if inferior varieties are not in close proximity to cross-fertilise it.

The grower should select a good variety, and stick to it, and plant no other on his farm, for corn will mix at considerable distances, and by planting two or more sorts he will not get the benefit of his careful selecting. Whether his variety be white or yellow is not material, for both are equally good where care is taken to develop their valuable characteristics.

In the absence of regular seed plots, where corn is specially grown for seed purposes, the above plan will be found, I think, the best, and will result in a vast improvement, both in yield and quality, in a few years.

Farmers sometimes wonder why their corn deteriorates in a few seasons, and the reason is, they pick big ears in a haphazard sort of way, do not pay attention to healthiness of stalk, uniformity of grain, nor conformity to type, which are all important, and this should be done in the field before the crop is gathered.

Where there are seed-corn growers who are systematically breeding corn for seed purposes only, it is well to buy seed of them fresh every four or five years, and this is done by many of the large growers in the United States, and they find it pays them well, as they get larger yields and it takes less seed, as 97 per cent. of well-bred seed will germinate, and every stalk will produce an ear.

No grower should be content to produce only 35 to 50 bushels of corn per acre when 75 to 100 bushels are possible in ordinarily good seasons. With modern tools the average good farm hand can plant, cultivate, and house 30 acres of corn, and if he, by painstaking care, brings his yield up to 100 bushels per acre and gets only 1s. 6d. per bushel for his corn, it gives a better return than wheat at 4s. with 35 bushels to the acre, and he harvests with less expense, as the corn will stand, and he is not forced to hire harvest hands at prices that cost a big per cent. of the crop to pay. Neither is corn so liable to damage in the field. As to the manner of planting, there seems a decided reaction in favour of planting in hills 40 to 42 inches each way.

The claim that drilling corn gave better results because the stalks were scattered and had more room to develop has been disproved by actual experiments with different varieties of corn, and it is also claimed that drilling is more exhausting to the soil.

An advantage of planting in hills is, that the crop can be cultivated both ways, and the field kept clean, without the use of hoe.

If the seed has been well taken care of, and carefully selected, three grains to the hill is sufficient, and can be thinned down to two stalks. It is better to thin than to replant, as replanted stalks are usually weaklings, and bear poorly. Corn-growers must bear in mind that cultivation of corn is positively necessary if even a fair crop is expected, and the first cultivation should be an ordinary tooth-harrow run over it, as you would harrow an ordinary ploughed field, and two or three cultivations should follow, each cultivation being across the previous one. The depth of planting is a question which varies with the soil conditions. Corn can be planted deeper in a sandy soil which drains out readily and warms up quickly than in the heavier clay soil. The corn should be planted deep enough to secure sufficient moisture for the best germination, but not so deep that it will be placed in a cold wet soil, where the grain is liable to rot and in any event to cause protracted germination, which is injurious to the plant. No matter what depth the seed is

planted, the roots branch out at about a constant distance from the surface, and in ordinary loamy soil this distance is between two and three inches.

If the grain is set down lower than this point, it sends out a root-system which develops a tube-like structure reaching to within two or three inches of the surface, at which point the real root-system branches out, and the first root-system is decayed and lost. Such a condition cannot be favourable to the best development of the plant.

REPORT ON WORK, QUEENSLAND AGRICULTURAL COLLEGE.

FARM.—A great deal of important work has been carried out during the last few months. The rainfall has not been sufficient for the successful growth of maize, sorghums, &c. The rainfall since the first of the year has been 5.31 inches, the principal falls being as follow:—January 4 (.53), 21 (.63), 24 (.55); February 24 (.86), 25 (.34); March 1 (1.48), 2 (.45). Rain fell on thirteen days in all. Of the twenty-four varieties of wheat planted, only one was a success as a grain-yielder—viz., Baltic Red—which returned 30 bushels to the acre of a very fair sample of grain. The other varieties yielded heavy crops of straw, but were all more or less affected with rust. The experiments of the last five years, and the experience in wheat-growing (for grain) on the coastal side of the Main Range, are most convincing that efforts in this direction really mean fighting against Nature. Of course, there are a few of the hard-flint and macaroni varieties which would yield very fair crops of grain, but I consider that land upon which such could be grown should be utilised in producing more suitable crops. I may mention, however, that the majority of wheats will do well and yield heavy crops of hay, provided, of course, that a little consideration be given to the selection of soil most suitable for producing a crop free from rank growth. Our oat crop turned out remarkably well, both as regards hay and grain. If threshed, it would yield at least 45 bushels to the acre. Rye has also been a success, the sample of grain being first-class. The early maize suffered for the want of rain, and, in consequence, the yield will not be high. I find that the Argentine maize withstands dry weather better than any other variety, although, even in the best of seasons, it will not be a heavy yielder. The imported American maize has been a failure with us; owing to the dry weather, the crop did not get a fair trial; it would, therefore, under such circumstances, be wrong to pass judgment on it. The following are the varieties of maize planted:—

Golden Beauty; Kansas Sunflower; Forsythe's Favourite.

Snowflake, with Ironbark and Colhoun pumpkins.

Argentine, with Crown and Ironbark pumpkins.

White Iowa Silvermine, with Turk's Cap pumpkins.

Mastodon, with Ironbark pumpkins.

Hawkesbury Champion, with Japanese pumpkins.

Hickory King, with Japanese pumpkins.

The following varieties of sorghums and millets have been planted:—

Millet, Yellow French; Millet, Hungarian; Millet, Chinese Red.

Panicum, *Panicum millicum*.

An ample supply of oaten, wheaten, panicum, and lucerne hay is stacked in the various paddocks, records of the yields from each plot having been kept.

Root Crops.—Swede turnips, mangels, and carrots have produced extraordinary yields, viz.:—Swedes, 22 tons per acre; mangels, over 40 tons per acre; carrots, 35 tons per acre. I find the mangel to be the best keeping crop, especially when left in the ground, where it will keep sound for many months. Next to the mangel is the carrot. The Swede goes off quickly, and should not be grown except for quick consumption. Different methods of saving this crop have been adopted, but without success.

Potatoes.—We harvested 9 acres for a yield of 36 tons 6 cwt., the sample being of excellent quality. The varieties were Blueskins, Brownell's Beauty, and Early Rose. The Brownell's Beauty, for a summer crop, is the highest yielder, the yield being 20 per cent. higher than the other varieties. The imported varieties (notwithstanding the fact that they were not planted until 2nd September, 1903, five weeks later than the latest ordinary time for planting) showed good results, and furnished useful information regarding the varieties best adapted to our soil, and also for early and late planting. The following is the average yield per acre:—

Variety.	Yield per Acre.	Remarks.
Up to Date	5½ tons	Good sample
Carmen's	8 "	Very good sample
Sutton's Flourball	6 "	Good sample
Peach Bloom	5 "	" "
Ld. Brittany	5 "	" "
Brown's River	4 "	Fair sample
Old Pinkeye	5 "	Good sample
Flat Top	4 "	Fair sample
Magnum Bonum	8 "	Very good sample
Vicar	5 "	Good sample
Barton's Red	4 "	Fair sample
Beauty of Hebron	5 "	Good sample
White Elephant	2 "	Poor sample
Acme	2 "	" "
Snowflake	2 "	" "
Excelsior	2 "	" "
American Red	2 "	" "

The varieties marked "poor," when planted in March or August, are all good, but, if planted out of season, they run to tops. The varieties marked "good" and "fair" will evidently come in for a later or intermediate planting, and give good results in yield and price by coming in between the ordinary crops. A large area of potatoes is being planted this year, advantage being taken of the quantity of seed on hand and the low market rates. In connection with the planting, various experiments are being carried out: Ploughing in *v.* drilling; cut *v.* whole sets; tests with one, two, and three eyes; rough and badly-shaped potatoes, &c. Small plots are being treated with different manures. The following varieties have been planted:—

Queensland Seed.

Avoca	Sussex Champion
White Rough	Early Puritan
Fiddler's Reading Giant	Blueskins
Snowflake	Early Rose
Chanceler	Brownell's Beauty
Magnum Bonum	
Lord Tennyson	
Kambridge Kidney	
Adison's Duck	
School Master	
Robin Adair	
The Bruce	
Red Russet	
Crompton's Surprise	
Duck Molloy's Champion	
Manhattan	
Up to Date	

Imported Seed.

Up to Date
Carmen's
Sutton's Flour Ball
Peach Bloom
Ld. Brittany
Brown's River
Old Pinkeye
Flat Top
Magnum Bonum
Vicar
Barton's Red
Beauty of Hebron
White Elephant
Acme
Snowflake
Excelsior
American Red

Dairying.—This branch of the College work commands a great deal of attention, not only from the students, but also from visitors from all parts of the State. The cleanly manner in which the cow-houses, yards, dairy, &c., are kept, is considered to be an object lesson for all who visit the place. At the present time 72 cows are in milk, giving good yields. The animals are grazed in the cultivated fields, and are frequently changed to different paddocks. When placed on the *Paspalum* paddock, a noticeable increase of milk is the result. Cross-breeding with the different purebred sires and ordinary cows has been carried out for some time. The young stock are now coming into milk, and the merits and demerits of these will be dealt with in a future report. The foundation of the College herd was laid with a few purebred animals—viz., 12 Ayrshire cows, 1 bull, 8 Jersey cows, 1 bull; a Guernsey cow and bull; a few Shorthorn cows and a bull. From the above animals we have built up a magnificent herd. None of our female stock have been sold, with the exception of a few that were suitable for beef only. We have, however, disposed of 62 bulls for the sum of £566 9s. 6d. Many of these animals were sold much below their value, because it was considered advisable to fix a price within the reach of dairymen. It is pleasing to note that, out of the 62 head of young bulls sold, one single complaint only has been made, and that because the animal was somewhat low in condition when it reached the purchaser. We have now a splendid lot of young stock coming on (the best we have yet had at the College), particularly the Ayrshires and Jerseys; we have now in all 213 head of female animals. A number of students, who are in their last term, are going through a special course of dairy chemistry, and are making good progress. They are much aided in this subject by the fact of their having gone through the factory work in all its branches.

Pig-raising.—We have been very successful in the line of pig-raising, our herd having been practically free from diseases of any kind. This, I think, may be attributed to the care that is bestowed in keeping the piggery clean, and by the fact that the animals are allowed plenty of outdoor exercise. Experiments, together with practical results, have proved beyond all doubt that the Middle Yorkshire, or the Middle Yorkshire crossed with the Berkshire, is the most profitable pig. Reasons for arriving at this conclusion will be given in a future article. We have a herd of over 200 pigs, which have been kept at a very small cost, being fed for the most part on carrots and mangels. The College has been the means of distributing some very valuable pigs in the various parts of Queensland. Up to the present time, we have sold 632 head of purebred pigs, for breeding purposes, for the sum of £1,026 12s. 3d.; also 441 baconers and weaners for £530 11s. 5d.; total value of stock sold, £1,557 3s. 8d. At the present time we cannot supply the demand for breeding-pigs.

TO INCREASE VALUABLE POTATOES.

When new varieties of potatoes come out they are generally so expensive that the ordinary farmer has to be content with a very small quantity, which he, of course, wishes to increase as quickly as possible. The following methods have been used successfully:—

THE HOTBED METHOD.

If a glass-house or frame is available, or better still, a good hot-bed with a sash over it, cut potatoes in halves, long and flat way, allow the cut side to get dry, and bury halves just under the surface in sand or sandy potting soil; in a short time the shoots will appear; as soon as they get well up out of the sand, remove them from the tubers with a sharp knife. Plant the shoots in small pots of good potting-soil, placing the pots in the glass-house or frame; in three or four weeks they will have rooted well, when they can be hardened in a bushhouse, and planted out into beds of specially prepared soil, well enriched

with a good potash fertiliser. In this way, with close attention, 100 or more shoots can be taken from one potato. Even this quantity can be further increased by taking cuttings from the plants and rooting them.

THE SPLIT-EYE METHOD.

If you have not the conveniences for the other method, you can get a very good increase in this way: Cut the potato into single-eye pieces, with as much flesh behind the eye as possible; with a very thin sharp knife cut each of the pieces into two right through the centre of the eye. We have known of this being repeated again with good results, but think that the average grower will get the best success with the half eyes. The land should be well prepared; in fact, you should do all you know to make a perfect seed bed. Give the plants plenty of room, and with fair weather the results will surprise you. If the weather is dry and you can give them some water, don't sprinkle them with the watering can daily, but open holes down between the plants, pour in as much water as the ground will soak up, then cover the hole again with dry soil; if you can only do this once a fortnight you will get better results than with a daily watering as generally practised.—*Australian Agriculturist*.

[In reference to the above, we think it high time that potato-growers in this State turned their attention to the production of new varieties of potatoes. Only last year we saw a field of 5 acres of potatoes in the Maroochy district planted with what purported to be Circular Head potatoes. The entire crop was not worth digging, disease having marked it for its own. Some of the newest varieties of English potatoes have already arrived here in small parcels, each potato valued at from 1s. 6d. to 2s. If these succeed here, farmers need not grudge to pay a very high price for them if they can get them from the importers.—Ed. *Q.A.J.*]

WILL THE POTATO BOOM LAST?

The *Mark Lane Express* says:—Prices of Northern Stars are falling, but holders of considerable quantities are not in the least worried about this. As a matter of fact, orders for Northern Stars are now being booked by many growers for 1904 delivery, which will give them a return of some £200 to £300 for 5 cwt. of seed planted. Even had they paid 5s. a lb. for seed, how much better is this than 2 tons of marketable old varieties—a ton more than was put in the ground. If the buyers in 1904, at from £15 to £25 a ton, can grow 12 tons instead of, say, 4 tons, will he be worse off than the grower who buys worn-out varieties at consuming prices? If by the question, whether the boom will last, is meant will three-figure prices last, then all depends upon what new varieties are brought out; but if it is asked whether good prices for the best varieties for seed are to be maintained, there is little doubt, after the bitter lessons learned in 1903, that they will. The prices of Eldorado, Northern Star, &c., will fall—must fall—if the varieties are to do any good; but if they prove good varieties, as, in the opinion of experienced men they will, then will the buyers this season at three figures a pound, and the following seasons at smaller prices until they sell at £10 a ton, reap handsome profits; and, lastly, and most generally, the grower of rare potatoes will benefit.

THE NEW ZEALAND FLAX INDUSTRY.

The flax industry in New Zealand was never so brisk as it is at the present time. At a low estimate, it is now giving employment to 6,000 hands.

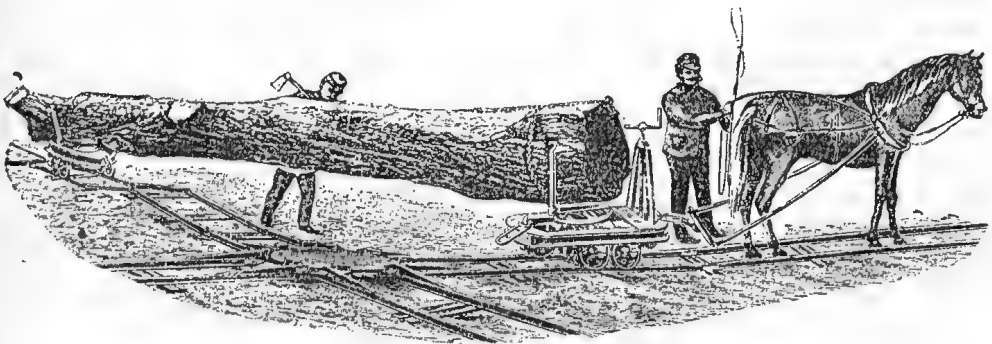
Last year the output of fibre was a record one, and Mr. C. J. Fulton, the chief hemp grader, believes that the quantity will be exceeded during the present year. The industry has made leaps and bounds in Southland and the

southern part of Otago, where there are now about seventy flax-mills at work. About sixty of them are employed in turning out fibre for export only. The produce of the other mills is used locally by rope and twine factories. There are now about 250 mills in full operation throughout that colony, and the number is being increased. The majority of millers are keenly alive to the necessity of improving their methods, and are turning out a first-class article, but some others are content to continue the use of plant which is thoroughly out of date.

Mr. Fulton is doing all in his power to encourage the cultivation of green flax, but he regrets to say that very little is being done in that direction. He recently received a letter from the United States botanist in charge of fibre plants, in which the writer says:—"The marked improvement in the quality and uniformity of grades of New Zealand fibre, which has been brought about by the introduction of your rigid system of grading and inspection, meets with the hearty approval of our American importers and manufacturers, and this approval is very plainly shown in the increased demand for the fibre, and the higher prices which are being paid for it."—*Farm and Home*.

FORESTRY IN GERMANY.

We here give an illustration of the method employed in the Black Forest for hauling out timber on a light tramline. It will be noticed that the trucks are provided with jaw-chairs, which hold the timber by means of stud staves with chains and hooks fixed to them. This combination also allows passing small curves and turn-tables in consequence of the rollers provided at the jaw-chair. Even great unevenness of ground offers no obstacle to these trucks. In the illustration a log is shown in process of passing from one line to another at right angles to it. A single horse can do as much on such a line as six or ten bullocks on the usual bush tracks.



Dairying.

MILKING OF COWS.

By G. S. THOMSON, F.R.S. Ed., Government Dairy Instructor.

Milking is a very important branch of the work of the dairy farm. It is so important that unless the young milker knows how to do it properly, the owner of the cows will lose a lot of money. Not only will your parents lose money, but the factories will also suffer loss, because it is in the factory where large quantities of butter and cheese are made. You will wonder why this should happen. It will seem strange to some of you to be told that you, young as you are, do work upon which much of the success of dairying depends. Let me explain how this is. Everyone knows that milk soon turns sour in the summer weather, but you do not know what causes the milk to lose its sweet taste and become acid. The important reasons for this change are as follows:—The milk has been allowed to come into contact with particles of dirt, and, secondly, it has been kept in a place where the air has been too hot. You have learnt now that particles of dirt and warm air can make milk change from a sweet taste to a sour one. What happens then when the sour milk is sent to the factory to be made into cheese, or to have the cream skimmed off by the separator to be made into butter? All of you will agree that the cheese will not be good if it is made from lots of sour milk, and the butter will not be nice either, because the milk was not sweet and fresh to begin with, and you are quite right, for that is exactly what happens. To prove to yourself that grains of dirt and hot air injure the milk, do the following very simple experiment:—Get two ordinary water glasses, wash them thoroughly, and number them 1 and 2. Into No. 1 pour a little dirty water that has been used for washing the cow's teats, but do not put anything into No. 2. Fill the two glasses up to the top with milk fresh and warm from the cow, tie a long piece of wet muslin over the mouth of each glass, and put No. 1 in a warm place, and No. 2 into a can of cold water, allowing the muslin to touch the water, but see that the water does not get into the milk. Change the water every few hours, as it must be kept cold, keep note of the time the milk takes to become sour and thick in both glasses, also look for the dirt in the bottom of No. 1. What you will learn from the test will teach you to be very careful and very clean when milking, and also to see that wet muslin or cheese-cloth is placed over each can of milk at night, and that the milk is kept in the cleanest and coolest part of the dairy where there are no bad smells. Bad smells and dust from the cowyards make the milk tainted, or, in other words, it has got a nasty smell and taste, often so nasty that you do not like to drink the milk. When you thoroughly understand what has been said, you will be able to see the good of following the rules which all milkers should practise. Let me give you these rules one after another, so that you may learn them off by heart:—

1. Milk the cows in a nice clean yard.
2. Be sure that the milk pail is perfectly clean.
3. Brush the cow's udder and the part of the cow (flank) that your head rubs against.
4. Rub the udder with a damp cloth.
5. Wash the teats of each cow with a separate supply of water.
6. See that your hands are thoroughly clean.
7. Moisten your hands in clean water when you are milking.
8. Remember to milk dry. Do not leave any milk in the udder.

You will see that the word "clean" appears four times in these rules. Now let us consider each rule separately. No. 1 speaks of the yard where the milking is done. Unfortunately, it is very often dirty, which makes milking unpleasant and injures the keeping qualities of the milk. Give assistance at home to the cleaning of the yards and whitewashing the milking bails.

Rule 2.—Wash the milk pail clean after milking, and then scald with boiling water, afterwards hang the pail, mouth downwards, in a clean place outside.

Rule 3.—Use a brush and rub off the loose hairs, pieces of straw, and dirt from the cow's udder and flank; neglect to do this often leads to taint in milk, cream, butter, and cheese.

Rules 5 and 6.—Wash the dirt well off the teats, and afterwards wash the hands in another supply of clean water. These rules are also of very great importance.

Rule 7.—Moisten the hands. Do not wet, or cause the fingers to drip when you are milking, and do not dip your hands into the milk in the pail. You will agree with me that Rule 7 must be very closely attended to.

Rule 8.—Strip well. If you forget to strip you will injure the cow, and she will go off her milk. The last milk is very rich, it is like cream, so that your parents will profit by your care. I have only one more thing to ask of you to do—that is, to treat the cows as kindly as you can. If you do not do this, the cows will not give down their milk. Unkindness before milking, such as chasing the cows with dogs, and unkindness during milking spoil many a good animal, and instead of yielding a lot of milk they only give a small supply, and it is not so rich in cream.

DAIRYING, No. 1.

“DRY” OR “WET” MILKING.

By G. S. THOMSON, F.R.S. Ed., Government Dairy Instructor.

In this State, and in all dairying countries, diversity of opinion exists as to whether cows should be milked with wet or dry hands. Dry milking is a strong point with some teachers of dairying, but it is open to objections. It does not seem to be clear, however, what is meant by the term “dry milking.” Assuming that it implies that the hands must be kept dry, then it cannot be recognised as a safe operation, involving danger and injury to cows of a nervous and irritable disposition. It is known that milkers object to animals of the smaller breeds owing to the shortness of the teats, and when difficulty arises in milking with the hands moistened, increased irritation to the cow must result from the “modern” dry practice. It might be asked how many men and women can milk with dry hands with comfort to the cow and profit to the farm? I am afraid the number is small, and the training of children who, in many instances, do the bulk of this work would entail considerable trouble. An attendant danger and one of vital importance in dairying is efficient stripping of the cow, and I question if the average dry milker has the activity left in his hands to finish this latter duty in a thorough manner. The nearest approach to the suckling calf is the most natural course to pursue, and one that is most appreciated by the cow, but when animals resent their milker, the result of slow, rough, and imperfect milking at a time when the greatest care in handling is necessary, disastrous consequences will follow. And, still further, the old practice will be strengthened if we accept the theory that milk formation is going on in the udder of the cow at the time of milking. That so much should be said against wet milking has arisen because of the universal neglect by milkers to adopt precautions to prevent contamination of the milk supply with dirt and microbe life. But does not dry milking cause the fall of particles of dirt and scales from the teats and udder into the milk equally as much as wet milking, if the cleanliness of the udder and flanks of the cow is not attended to? The bad habit of dipping the fingers into the milk pail and having the hands dripping with milk should no longer be permitted. Having the hands moist during milking is the most sensible and safe course to follow, and with other points attended to the milk should be free from foreign matter. If milking were practised according to the rules given above, and which are stringently pursued on some farms, there would be no reason why dirt should find its way

into milk at a stage when conditions are so favourable for the development of taints. There is no necessity for washing the udder of the cow unless mud is adherent to the hairs and skin; but it is essential for each milker to be provided with sufficient water that will allow of the teats of every cow being washed in a separate supply, and not, as we usually find, a little in a basin used for a whole herd. It is from such simple neglect as this that so much harm arises in dairying. Every milker ought not only to study the importance of successful milking, but should keep continuously in mind that want of cleanliness is responsible for many of the worries and disappointments of the butter and cheese maker and milk-consumer and heavy losses to our factories, and injury to the industry and State. It is into the milking pail that many of the seeds of taints are thoughtlessly and carelessly admitted.

THE DAIRY HERD.—QUEENSLAND AGRICULTURAL COLLEGE.

RETURNS FROM 1ST TO 29TH FEBRUARY, 1904.

Name of Cow.	Breed.	Date of Calving.	Yield of Milk.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Annie Laurie*	Ayrshire ...	22 Nov., 1903	816	3.8	34.72	
Amy ...	" ...	26 Feb. "	385	3.4	14.66	
Annie ...	" ...	18 Feb., 1904	444	3.9	19.39	
Bonnie ...	" ...	19 Sept., 1903	461	3.4	17.55	
Blanche ...	" ...	17 Oct. "	320	4.2	15.05	With first calf
Cocky ...	" ...	22 Dec. "	578	3.8	24.60	With first calf
Leesome ...	" ...	27 Feb. "	542	3.7	22.46	
Lena ...	" ...	26 Feb. "	432	3.8	18.38	
Laverock*	" ...	19 Aug. "	458	3.7	18.97	
Lavinia*	" ...	26 Nov. "	766	3.5	30.02	
Luck ...	" ...	28 Nov. "	416	3.7	19.06	With first calf
Lottie ...	" ...	28 Aug. "	429	4.0	19.21	With first calf
Lightning ...	" ...	15 Jan., 1904	693	3.8	29.49	With first calf
Linnet*	" ...	3 Jan. "	1,011	3.5	39.63	
Lulu ...	" ...	26 Oct., 1903	453	3.6	18.26	With first calf
Laura ...	" ...	3 Dec. "	592	4.0	26.52	
Ruth ...	" ...	15 Dec. "	584	4.2	27.47	
Realm ...	" ...	15 Dec. "	478	4.2	22.48	
Ruby ...	" ...	18 Jan., 1904	718	3.6	28.94	
Lonesome ...	" ...	10 Feb. "	275	3.8	11.90	
Rosebud ...	" ...	27 Nov., 1903	417	4.2	19.61	
Belle ...	Jersey ...	8 July "	138	5.0	7.72	Dry, 22 Feb., 1904
Connie ...	" ...	5 May "	401	5.0	22.45	
Cocoa ...	" ...	17 Dec. "	363	4.2	17.07	With first calf
Carrie ...	" ...	16 Jan., 1904	616	4.0	27.60	
Eileen ...	" ...	16 June, 1903	341	3.5	24.82	
Ivy ...	" ...	1 Jan., 1904	613	4.1	28.14	
Playful ...	" ...	17 July, 1903	398	5.0	22.28	
Stumpy ...	" ...	3 June "	284	6.0	19.08	Dry, 26 Feb., 1904
Bliss ...	" ...	27 Feb., 1904	98	5.0	5.48	With first calf
Alice ...	Shorthorn ...	28 April, 1903	454	4.0	20.34	
Chocolate ...	" ...	17 Nov. "	471	3.0	15.82	With first calf
Dott ...	" ...	30 Sept. "	524	4.2	24.64	
Guinea ...	" ...	16 Nov. "	651	3.2	23.33	
Cherry*	" ...	2 Feb., 1904	716	3.5	28.06	
Kathleen ...	" ...	15 Jan. "	559	3.9	24.41	With first calf
Louisa ...	" ...	3 Jan., 1903	446	4.0	19.98	
Lady Vixen ...	" ...	16 Jan., 1904	724	3.5	28.38	
May ...	" ...	16 Dec., 1903	567	3.9	24.76	
Nestor ...	" ...	7 Jan., 1904	818	3.8	34.81	
Princess ...	" ...	6 Dec., 1903	544	3.6	21.92	
Rose ...	" ...	21 July "	315	4.4	15.52	
Queenie ...	" ...	8 Dec. "	508	4.2	23.89	
Tottie ...	" ...	11 July "	437	4.0	19.57	With first calf
Winnie ...	" ...	7 Oct. "	572	3.5	22.42	With first calf
Lemon ...	Grade Shorthorn	19 July "	404	4.0	18.09	
Lucy ...	" ...	18 Oct. "	565	3.8	24.04	
Molly ...	" ...	19 Feb., 1904	180	4.0	8.06	
Rosella ...	" ...	27 Feb. "	29	3.8	1.23	

THE DAIRY HERD—continued.
RETURNS FROM 1ST TO 29TH FEBRUARY, 1904.

Name of Cow.	Breed.	Date of Calving.	Yield of Milk.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Drone ...	Ayrshire Sh'rth'rn	7 Oct., 1903	426	4.4	21.0	
Haze ...	" "	1 June "	392	4.7	20.63	
Jeanie ...	" "	6 Jan., 1904	921	3.8	39.19	
Madge ...	" "	3 Jan., 1904	500	3.7	20.70	With first calf
Mince ...	" "	10 Jan. "	481	4.3	23.16	With first calf
Nancy ...	" "	12 May, 1903	397	4.2	18.67	
Nada ...	" "	18 Jan., 1904	584	3.6	23.54	With first calf
Ping Pong ...	" "	" "	516	4.0	23.11	With first calf
Rita ...	" "	17 Oct., 1903	410	3.6	16.52	With first calf
No. 46 ...	" "	8 April "	484	4.1	21.22	
No. 48 ...	" "	4 Feb., 1904	603	3.8	25.66	
Nina ...	" "	10 Feb. "	278	3.6	11.20	With first calf
Venus ...	" "	13 Feb. "	251	3.8	10.68	
Brindle ...	Jersey Shorthorn	16 Dec., 1903	557	4.2	26.20	
Pansy ...	Grade Jersey ...	15 July "	440	4.6	22.66	
Donah ...	Holstein ...	2 Feb., 1904	569	3.5	22.30	With first calf
Mona ...	Holstein Sh'rth'rn	8 Sept., 1903	617	4.0	27.64	
Maggie ...	" "	14 May "	177	4.4	8.71	
Night ...	Holstein Devon...	12 Aug. "	442	4.4	21.78	
Whitefoot ...	" "	10 Aug. "	402	4.1	18.45	
Reanie ...	" Hereford	21 Sept. "	568	4.0	25.44	
Fancy ...	South Coast ...	14 Oct. "	862	4.2	40.54	
Grace ...	" "	28 Oct. "	597	3.8	25.40	

The cows were grazed on *Paspalum dilatatum* and natural pasture, with the exception of those marked *, which were allowed in addition 20 lb. of carrots night and morning.

WHY HAS AUSTRALIAN AND NEW ZEALAND BUTTER FALLEN IN PRICE, AND NOT DANISH?

In discussing this question, the *Pastoralists' Review* says that the difference, instead of lessening as our butter becomes better known, has increased strikingly during the last year, so that it now stands at as much as 14s. to 16s. per cwt. Whereas our butter was at Christmas down to a 100s. level for "choicest," having fallen from 110s. to 112s. during the twelve months, the Danish prices stood steadily at about 114s. to 116s. Our correspondent says that "no one dreams of suggesting that the difference between the two kinds is accounted for by the Danish superiority," and discards the suggestion that it is due to the large quantity of winter butter left over or to the fishiness of our new season's Victorian. These things, he says, "may lower the values for the secondary and inferior grades, but do not affect the crack brands." He seems to think that the depreciation of these is partly due to "a tendency to regard colonial butter of choicest quality as a 100s. butter suitable for retailing at secondary shop prices." Some inquiries we have made from the trade on this side point to the conclusion that the two butters tap two different markets. The Danish supply remains about the same as last year, and consequently the price is not changed. The Australian and New Zealand supply has largely increased, and therefore the price has gone down. But it has not affected the Danish price, because it does not enter into the Danish market. This is corroborative of what our correspondent says about our choicest butter being stamped by market opinion as a 100s. per cwt. or 1s. per lb. butter. We suspect that our butter not entering into competition with the Danish is also due to the irregularity of the supply. There is nothing a tradesman dislikes more than not being able to rely upon a continuous supply of an article which has become popular. If we can turn out a regular supply of butter equal in flavour to Danish, nothing in the world can prevent its competing in the same market and fetching the same price before long.

[What about the revelations concerning the export of Siberian butter to Denmark?—Ed. *Q.A.J.*]

Poultry.

LECTURE BY MR. FERN AT HIGHFIELDS.

The sixth series of lectures under the auspices of the Aubigny Farmers' Progress Association was lately held in the Highfields State School. The lecturer was Mr. M. Fern, Government Poultry Expert. The lecture was beautifully illustrated by Mr. H. W. Mobsby, artist of the Department of Agriculture, with limelight lantern views. Mr. H. Franke (vice-president) occupied the chair. The attendance was a record for the district, and included about twenty ladies.

Mr. Fern, in opening his address, referred to the importance of poultry-raising. The question was regarded in Queensland in a very light manner by our farming community. Such was not the case with Americans. The industry in the United States alone had reached the enormous dimensions of £158,000,000 per annum. Mr. Fern, by the aid of views, showed the progress of some of the most important poultry farms in the United States. One instance was given where a farmer commencing with a dozen fowls, by selling them and purchasing a purebred, had in twelve years worked his income up to £1,000 per annum. He did not approve of poultry-raising alone, but advised combining it with other farming pursuits. There was a good deal of money in it, and only required a little attention to detail to make it a success. The Queensland farmer was not going on the right lines to make poultry-raising what it should be. His flock of fowl was a mixed breed; in fact, so much that it was hard to tell what they were. His advice was to get rid of all scrubbers, and go in for one particular breed. Whatever breed was fancied was the best to follow up. The question of marketing was easily got over. In England there is an unlimited demand for poultry, and, with present facilities in refrigerating, transit was easily accomplished. The Minister for Agriculture had assured them everything would be done to encourage the industry. A number of slides were shown illustrating the export of New Zealand poultry to South Africa and England. In exporting birds it was important that they should be plump and young, and a bird of white flesh sold best in the English market. If the right breed was raised the fowls ought to be fit for market in from twelve to fifteen weeks, and weigh from 3½ lb. to 5 lb. A cross between the Buff Orpington and Indian Game would produce a good table fowl, or Indian Game and Dorking would suit well. The English Dorking did not thrive well in the colonies, and the cross between Orpington and Game produced a meaty bird. We should not be afraid of over-producing, for one firm in England alone absorbed 10,000 pairs per week, and there were twenty firms and more which would receive more than that number. The South African markets absorbed a large quantity of poultry, and, even at our own door, Brisbane would purchase all we could rear for some time to come. It would not be over-estimating the price to put them down at 5s. 9d. to 6s. 9d. per pair in the British market if a first-class bird was produced. Like all other kinds of produce, poultry required grading. The birds should be of equal size, weight, and age, and sold by weight. Putting in an old bird often spoiled the sale of a pen of younger ones, and errors of this kind should be avoided if a successful price be realised. Here illustrations were shown of the different methods of preparing fowls for market. Following up his address, Mr. Fern tendered some excellent advice on the different varieties of fowl. The Buff or Black Orpington was a good all-round class of bird, being a good layer and table fowl. Some people fancied the Wyandotte and Leghorn. The latter was a good layer, but the white variety was not suitable to our red soil. It was important that the bird should show good points. A square body,

clean comb, and clear black eye indicated a good layer. At the recent show he saw some good birds, but not enough for such a large district as the Downs. Mr. Kennard had some fine varieties, and he was pleased to note that he had entered his birds for the laying contests at Hawkesbury, New South Wales; in fact, the only Queensland representative. The Plymouth Rock was another splendid all-round bird, and always looked well for marketing purposes. The egg and poultry production for six months on some well-conducted poultry farms averaged from 22s. 6d. to £5 per bird. At present there were on the Downs acres of grain fields where shed grain lay thick. If wire netting were procured and sections of the fields fenced off, it would feed thousands of fowl without much extra cost, and save a lot of grain which otherwise would be lost. It was explained how fowlhouses could be built, and on movable principles. It was a mistake to keep young cockerels with the hens, as they eat a large proportion of the food. A fowl should not be kept more than two and a-half years. Cleanliness was one of the most important matters the poultry-raiser had to consider; without it, he was sure to lose most of his flock. The water to drink should be fresh and clean, and the food served in troughs. The food should not be too soft, but in granulated form. Grit, in the form of ground glass, should be given at times, and milk was an excellent food for all kinds of poultry. Ducks were very profitable, but should not be kept with hens. The Indian Runner was the best for laying purposes, and the Muscovy for the table. Duck ponds were not necessary. Turkeys were also a profitable breeding, and did best on hilly country. They required plenty of scope. The bronze-wing variety was considered the best. Mr. Fern then illustrated how to test a fertile egg, and gave a few hints on the incubator. Throughout his address the audience listened most attentively, and he was frequently applauded. He impressed on his hearers the importance of his subject, and it may be said he has sown the seeds of a new industry, which, it is to be hoped, will grow and flourish like it has done in America. The lantern views were splendid, for without them the lecture would lose much of its educative principles. Mr. Mobsby also exhibited a series of slides illustrating different parts of the State, and recent pictures of the Toowoomba Show. A picture of the Minister for Agriculture was received with loud cheers.

Mr. W. S. Browne, on behalf of the association, proposed a vote of thanks to Messrs. Fern and Mobsby for their lecture. He was sure it would be the means of inducing the farmers to add to their industries that of poultry-rearing. The vote was carried by acclamation.

Mr. Fern, in reply, congratulated the association on their work in the interests of farming. From what he heard, he thought the Aubigny Farmers' Association was the most prosperous in the State.

Mr. Mobsby also thanked them for their attention. He explained the advantages of the *Agricultural Journal* and Department, and trusted they would always render useful assistance to the farmers of the country.

A vote of thanks by Mr. Fern to the chairman closed a successful meeting.—*Toowoomba Chronicle*.

PREPARING FOWLS FOR SHOW.

Moving houses, which are so extensively used by leading exhibitors of the present day for keeping birds in show condition, are about 4 feet by 8 feet, all covered in, with a part about 3 feet square at one end for roosting purposes for three birds. This should be moved on to fresh short grass every few days. Otherwise you must and can keep them in a covered run, the floor of which should be fine sand and the sleeping apartment soft hay, often renewed. Add equal parts of biscuit-meal and ground oats to the soft feed. Do not forget a fair amount of green food and a little cooked meat at noon, and substitute oats in place of the wheat. A sheaf of unthreshed barley will provide them with

an occupation which is good for them. White Leghorns will want a certain amount of training to fit them for the show pen. This is better done in a small pen, where you can handle them and stroke them down, and get them accustomed to being handled. Then you can, with a short, smooth stick, teach them to stand well, and show off their best points. If you feed them by hand, giving them little bits of cooked meat through the bars or wires of the pen, they will soon learn to come to the front. So much for training. Before going to the show they will require washing, and this is best done two or three days previous to the show. In washing Leghorns you require three lots of water—soft water, if possible. The first lot of water should be nice and warm. Hold the bird in this a few minutes, the head, of course, being out of the water. Now take some Sunlight soap, and rub it well into the feathers with your hand until you get a good lather and the bird soaked to the skin. Keep squeezing out all the dirt, then dip the bird again in the water, and repeat the soaking and rubbing. Before taking the bird out of this water, try to get all the soap you possibly can out of the feathers, then place her in water No. 2, which should be warm, and sponge the bird thoroughly, getting any remaining soap out of the feathers. Now with your sponge endeavour to get as much water from the feathers as you can before you put her into No. 3 water. This will want just a little blue, enough to tinge the water a light-blue colour. Hold the bird in this water, and rub the feathers well with your hand under the water, so that the water penetrates all through the feathers; after this, dry the bird as much as you can with the sponge, then use a soft towel, and dry the bird by rubbing the feathers carefully one way only. The bird should now be placed in an unlined exhibition basket about 2 feet from a nice bright fire; keep turning her round every few minutes, so that she will dry evenly all over. Give her a final rub down with a silk pocket handkerchief. Just before going to show give the legs and comb a final wash, using a soft nailbrush, and after drying apply just a little olive oil to comb and legs. A good rub with a piece of rough flannel will greatly improve the leg colour. See that there is no dirt under the scales on legs and feet. The above treatment, along with a small piece of sulphate of iron in the drinking water during the time you have the birds penned, will be all you need to turn out the birds in first-class condition.—*Sydney Mail*.

POULTRY NOTES.

Poultry will do better on work, grit, and grub than on grub alone.

Let the poultry occupy the orchard during all the insect breeding season.

Tell it to all, gently, firmly, but effectually: The absence of clean grit is the death of millions of the wee birdies.

Grain is a greater part of the time very low in price. Eggs bring a fair price the year round. Instead of selling all the grain, feed it to the fowls and sell the eggs. It will pay.

Let it ever be remembered that a change of diet is not alone relished but healthful to all animate creation, and to domestic fowls particularly. Fresh meat gives fresh courage.

As chickens grow older feed grain, either whole or cracked. Table scraps and garden green may also be given. Keep pulverised charcoal and fine gravel within their reach all the time.

A half a dozen water fountains are among the most desirable articles in a poultry yard. Impure water conveys disease to birds quite as readily and effectually as to human beings.

Probably no living thing is so dependent upon work for its health as the domesticated fowl. Whatever, therefore, you feed to them, make them scratch for it, unless you are fattening them for the market.

On general principles the smaller the flock the greater per cent. of eggs; but, of course, there is a limit. Very much depends upon the care given and the amount of work required of the hens.

In buying birds or eggs, go to some reliable breeder dealer, who has his reputation at stake. You may have to pay a little more for birds, but you can depend on what you get. Culls are not cheap at any price.

Never feed whole grain to young chicks. Bran is better than maize meal, as it contains more mineral matter, and is one of the best bone-forming foods that can be given to growing fowls; but it should always be scalded.

There is only one thing for a man to do, or woman, either, for that matter, who doesn't like the bother of poultry, and that is to quit. Turn the business over to someone who loves it, and will therefore give it constant and unremitting attention. A faint heart never won fine hens.

The value of a flock of fowls is mainly in its physical vigour; in constitution; in capacity to work, to hunt, to hustle, and to scratch. The poor man's fowls are apt to be strong, vigorous, and active; hearty eaters, of good digestion, and first-class layers. The rich man's fowls are too often like the rich man's sons, indifferent workers, and but poor tools at anything.

It will be borne in mind that the birds of the air and beasts of the field need water only in proportion as their food fails to supply it. Birds, sheep, swine, cattle, horses, and men fed on green or watery food drink but little, whilst the same fed on dry feed have to supply the waste of the system by drinking. Feeding it to birds or beasts is of the two the more natural and healthful.

The farmer who refuses to go to the expense of fresh, young, vigorous males this winter will be very apt to find his chicks mopey, lifeless, and useless. They will be very apt to become sick with the first cold wind or damp, chilly day. The flock must be kept vigorous by fresh blood and males not akin to the balance of the yard. There are few better thermometers to mark good management than a fine flock of fowls.

Do not keep a hen with chickens confined in a coop unless it is a large one, and then only in bad wet weather. It is almost impossible to keep a confined hen free from lice. If she has her liberty, she will dust daily and rid herself of the pests, and the little chicks will learn at an early age to wallow in the dust. Let them roam over the garden and fields, and they will gather a large part of their food, and benefit the farm and garden by ridding them of insects.

PRACTICAL POULTRY-BREEDING, No. 6.

By W. HINDES.

Duck Breeding.—There are various breeds of ducks, the most popular, for laying purposes, being the Indian Runner, while Aylesburys, Pekins, and Rouens are the best for market. There are also two new varieties—Blue Orpingtons and Buff Orpingtons—which are good useful birds, but, as these are not often met with, I will deal principally with the four older breeds.

Indian Runners are small ducks, weighing from $3\frac{1}{2}$ to 4 lb. each, drakes 1 lb. heavier. There are two recognised colours—fawn and white and grey and white, fawn being the original colour. They are too small to rank as market

ducks, although very tender and juicy, with a fine flavour, but as layers they are unsurpassed; they are good foragers, and, therefore, small eaters. They have been known to lay as many as 200 eggs per year.

Rouens are very handsome ducks, the drake's head and neck being of a rich green colour glossed with purple; there is a white ring round the neck, the breast is a rich claret, running into French-grey underparts pencilled with black. The duck is a brown colour pencilled with dark-brown. Both duck and drake have a blue ribbon-mark across the wings. They are very hardy, and a good size, weighing 6 to 7 lb. each; the flesh is delicate, they mature fairly quick, and are moderately good layers.

Aylesburys are large white ducks, splendid table birds, great favourites in England, where they come from. They have a great length of body, which is carried almost horizontal. Any yellowness in the plumage shows Pekin blood. The legs are a bright orange colour, while the bill is flesh-coloured, though it will turn yellow if exposed to the sun or if the ducks are running on grass. The drake differs in no respect from the duck, except that he is a little larger, and has, after the first moult, two curled feathers in the tail; the sexes can also be distinguished by the duck's quack, the drake's being much fainter and more husky in character. They are better layers than the Rouens, mature early, and are very good for export, either pure or crossed with the Pekins or Rouens. The weight of good stock should be 7 lb. at twelve months old; exhibition specimens will go much higher (10 lb.), but are not so good to breed from, having been forced to attain that weight.

Pekins are of a creamy-white colour, shorter and thicker in body than the Aylesbury; their legs are set on further back, and their carriage is more upright. They grow to a great size, mature quickly, and are really good layers. Care, however, must be used when attending them, as they are very timid, and must not be frightened. Good strains of Pekins have been known to lay 150 eggs each in a year, and the fact that they are also first-class table birds makes them very valuable. They make a good duck for export, either pure bred or crossed with the Aylesburys; this is a favourite cross. They should have yellow bills and orange-red legs. The neck is somewhat long, and the head large in proportion. This breed also differs from the two preceding in having no "keel"; this gives it a better appearance at table.

Ducks require different feeding to fowls; unlike the hen, the duck has no crop, the passage or duct leads direct to the gizzard from the throat, so that they cannot assimilate hard grain to the best advantage. They also require bulky food, as they are large eaters when growing; they will eat twice as much as a chicken, and grow twice as fast. For adult ducks soft food should be fed morning and night, with just a little grain at midday; young growing ducks should be fed mostly on soft food; good heavy oats ground up, husk and all, make a splendid food, it can be mixed with pollard and bran and boiled vegetables in equal quantities, a little animal food being added; this will make a good soft food, and the ducks will thrive and do well on it. They should also have a good supply of sand and oyster-shells to assist digestion, also plenty of clean water, frequently changed.

Ducks of any of the above breeds should be ready for market in from ten to twelve weeks from the time of hatching.

The Muscovy drakes grow to a great size, but the ducks are not large. They require one week longer to hatch, and fourteen weeks to get ready for market. They are popular with some people, but, owing to the fact that they take two or three weeks longer to mature, and their black pin-feathers, they would not be well suited for export; in our local markets, however, they generally bring top price.

[There are white Muscovy ducks which have no black pin-feathers. Probably these would be suitable for export.—Ed. Q.A.J.]

WHY FARMERS SHOULD GROW MORE POULTRY.

Amongst many reasons why Australian farmers should largely increase the quantity of poultry annually produced are the following:—

First.—Because the farmer ought, by their means, to convert a great deal of the waste of his farm into money in the shape of eggs and chickens for market.

Second.—Because, with intelligent management, they ought to be all-year revenue producers, with the exception of perhaps two months during the moulting season.

Third.—Because poultry will yield him a quicker return for the capital invested than any of the other departments of agriculture.

Fourth.—Because the manure from the poultry-house will make a vegetable compost for use in either vegetable garden or orchard. The birds themselves, if allowed to run in plum or apple orchard, will destroy all injurious insect life.

Fifth.—Because, while cereals and fruits can only be successfully grown in certain sections, poultry can be raised for table use or layers of eggs in all parts of the country.

Sixth.—Because poultry-raising is an employment in which the farmer's wife and daughters can engage, and leave him free to attend to other departments.

Seventh.—Because it will bring him the best results in the shape of new-laid eggs during the winter season, when the farmer has the most time on his hands.

Eighth.—Because to start poultry-raising on the farm requires little or no capital. By good management poultry can be made with little cost a valuable adjunct to the farm.

Ninth.—Because there is an unlimited market in Great Britain for all the poultry we can supply.—*Farm and Home.*

COTTON IMPORT INTO THE UNITED KINGDOM.

After the two large groups of merchandise known as breadstuffs and meat-products, the most important factor of the agricultural import trade of the United Kingdom is cotton, enormous quantities of which are annually purchased to supply the British mills with raw material. For this staple article, which is the basis of one of their greatest manufacturing industries, the British people are largely dependent upon the United States. During 1900 there were shipped to the British market from all sources 1,779,000,000 lb. of cotton, having an aggregate value of £40,000,000. Of these imports 1,760,000,000 lb., worth over £37,800,000, consisted of raw cotton, and 19,000,000 lb., worth £131,200, of waste cotton.

Of the raw cotton imported the United States furnished 1,365,000,000 lb., valued at £29,400,000, or 74 per cent. of the total. Next to the United States the most important source of supply was Egypt. The peculiar, long-fibred cotton of that country was imported to the extent of 312,000,000 lb., the value amounting to £8,800,000, or 22 per cent. The British East Indies also supplied cotton in considerable quantities. From that source 37,000,000 lb. were procured, the value being £677,400, or 1.7 per cent. Madras furnished the principal part of these shipments. About 30,000,000 lb., valued at £651,800, or 1.6 per cent., came from Brazil. Peru, Chile, and China stood foremost among the countries from which additional imports were received.—Agricultural Imports of the United Kingdom, 1896-1900. U.S. Department of Agriculture.

The Orchard.

POULTRY IN THE ORCHARD.

By S. C. VOLLER.

Poultry farming has come to the front a good deal lately, and, I think, rightly so, for I see no serious reason why Queensland should not gain as much, proportionately, from her fowls as other countries are doing.

There are many people, both near our big towns and away in the country, who are turning their attention very carefully to the matter of poultry farming.

I am not going to launch out on an article on poultry farming, but I wish to wake the fruit-growers up to the fact that they, possibly, have a double chance of making poultry pay.

Our fruit-growers are, generally speaking, engaged in more or less mixed husbandry, and, of course, fowls are part of the general economy of the place, so to speak. But I do not know if many of our orchardists have ever worked poultry systematically in conjunction with their orchards, yet I am sure it will pay to do this.

Poultry are great scavengers and hunters. They run over a lot of ground, scratch the surface in all directions, and have marvellously quick sight for the detection of all sorts of insects.

The fruit-grower has no end of insect and fungus enemies, and quite a number of these are the natural prey of the fowls, but their increase can be largely, if not quite, prevented by this means.

Take that arch-fiend, the fruit fly, for instance. It is true that fowls cannot catch it on the wing, but when in the maggot stage in, or coming out of, fruit, and when in the chrysalis stage just afterwards, its end is certain if the fowls come along.

Many of our orchardists take all manner of care to check the increase of fly in their gardens by gathering and boiling all dropped and affected fruit, and there can be no question that this is the most important thing a grower has to observe. But anyone who notices carefully what takes place in regard to the development of the fly in many varieties of fruit will know this: That maggots frequently eat their way out of fruit which is still firm on the tree, fall to the ground, gain the cover of the soil, and turn out in a short time again as flies. Again, over-ripe or partly rotten fruit will sometimes fall and burst on the ground, and the maggots thus get away, in spite of all care in gathering up the fruit from time to time.

In a big orchard, and especially when there is a heavy crop, a larger number of flies are bred up in this way than many people would imagine, and the fowls, if on the spot, would capture the greater part of these.

Then, supposing the maggot to have escaped and to have gone through the chrysalis stage, and come out of its hiding-place as a fly, it is still under the greatest danger of being caught by the poultry, as it cannot fly away until its wings are properly formed and strong, and this does not come about until some little time after it has crawled out from the ground. Codlin moth in the grub stage would also be caught by the fowls, as, after leaving the fruit in which it has grown, it lowers itself to the ground and crawls away to some convenient shelter, generally the nearest tree-trunk.

Grasshoppers, grubs, and caterpillars of many kinds, bugs, &c., which attack fruit, would all come in for prompt attention, and such detailed attention as the grower could not manage to give himself.

I can give more than one instance where growers have assured me that the presence of poultry in their orchards has assured them clean crops, and I can believe it.

Now, if the fowls on a farm are paying, they will pay better by being utilised in this way, for they will not only get a good part of their living in the orchard, but will very probably add a big increase to the sales of fruit. I am quite sure in my own mind that, where a grower is already careful in other ways in the matter of keeping down pests, if he will try the poultry, and try them properly, he will be very pleased with the results.

The orchard will help the fowls to pay, and the fowls will help the orchard to pay, and I know a good many orchards in this State to-day where there is room for this.

POISONING THE FRUIT FLY.

By S. C. VOLLER.

Reference has been made in the Press to the fact that I had tried poison against the fruit fly this season, and as no detailed information was given it may interest readers to know just what I did and how I did it.

I have frequently noticed odd flies apparently feeding on fruit such as apricots, which had split and had partly rotted as they ripened, but I have looked in vain for a feeding-ground where I could get numbers together, and thus have a chance of destroying them.

During my work this season, I was, on one occasion, taking over-ripe and bad fruit off a couple of trees with a view to putting it in the boiler. When the five-gallon drum I was using was full, I pressed the contents down with my hands, and then wiped my hands on part of the foliage of one of the trees. In two minutes there were a number of fruit flies there, sipping at the stuff I had rubbed off my hands.

That was a hint for me.

I got a small tin, mashed up some of the fruit, took some prickly-pear poison diluted with about one-third of water, and mixed the lot up.

I then cut some twigs with a few leaves on, smeared the leaves with this bait, and hung the twigs in an apricot-tree; then I quietly watched for results. Almost immediately came three or four flies, evidently attracted by the scent. These lodged on the bait, and sipped at it. In twenty minutes I got sixteen flies, dead or dying, under the bait on one tree, and how many got away and died elsewhere I do not know.

What I do know is, that this bait kills; and, seeing that fruit-growers need to use all means at their command for coping with their enemy, the fly, I may offer this statement of my experience for what it is worth. I may just say that I used a good many baits after this, and in every case I think they accounted for a few flies.

I found my bait kept well in a tin, and I used the same lot of stuff for quite a week. Care will be necessary to avoid leaving the bait about, especially where there are children. The vessel containing it should be marked "Poison."

Baits are of little or no use after they become quite dry, and therefore want renewing.

USEFUL INFORMATION FOR FARMERS AND FRUIT-GROWERS.

In this issue we publish three short articles by Mr. S. C. Voller, Assistant Instructor in Fruit Culture, on the fruit fly, the sweet-potato weevil, and on poultry in the orchard. They are the outcome of Mr. Voller's practical experience, and being clearly written in plain English, devoid of all technical phraseology, they can be easily read and understood by all. The two remedies given for the destruction of pests are inexpensive, and can be carried out by any fruit-grower or farmer, and we advise them to try their effect, and to notify us of the result.

MOOLOOLAH BANANAS.

We have received from Mr. C. Court, of Mooloolah, some of the finest bananas we have yet seen of Queensland growth. There are thirty fruits on each hand, and each banana measures 10 inches in length with a girth of 5 inches. Abnormally large fruit is frequently insipid or coarse, but these bananas are of excellent flavour. Such fruit should find a ready sale at a good price in any of the Australian markets. It was Mr. Court who raised the Aurie strawberry, a new variety, which comes into bearing some weeks before the Marguerite, Pink's Prolific, Hautbois, and others, and continues to bear heavily for six and even seven months consecutively. It will be noted that Mr. Court is now advertising plants of the Aurie strawberry for sale during the coming planting season.

ORCHARD PESTS.

By W. CASTLES.

I have read with pleasure the advice given by Mr. Benson, your fruit expert, in Orchard Notes which appear in the January number of the *Agricultural Journal*. He says:—"The fruit fly must be systematically fought by gathering and destroying all infected fruit," and he might have added—immediately after it has fallen, as allowing it to lie, even for an hour, in some instances, enables the maggot to leave the fruit and safely effect its hiding in the soft earth, whence it soon after emerges as a full-grown fly to continue its depredations.

Mr. Benson has, I believe, got the correct grip of the situation, and I unhesitatingly say that only on such lines will the pest be successfully overcome. In 1895 my garden on the Logan, which contained about 40 trees, was so badly infested that all our apples, pears, plums, persimmons, and even our grapes were destroyed.

What seemed to us very strange at the time was, finding that a China pear-tree, growing in the pasture some twelve to fifteen chains distant, had ripened its fruit without the attack of a single fly. This at once gave me the idea that the fly does not travel very far. The same year I visited Mr. Parker at his place, "Glen Retréat," and found he was having a similar experience. He told me that in a deserted garden adjoining and only a few chains distant from his orchard the peaches were quite sound, and had not suffered from the pest. This was even stronger evidence that the fly did not travel, as everything in Mr. Parker's garden was destroyed. My conclusion drawn from these facts is, that every person breeds his own fruit fly. Owing to the pear-tree in my pasture being surrounded by hard ground, grass-covered, and the same conditions prevailing in the deserted garden adjoining Mr. Parker's, the soft cultivated ground not being present into which the maggot could enter, it became a prey to insect-eating birds or perished by the heat of the sun, and because no fly was bred in connection with these trees the fruit was clean. In 1896 I commenced to gather all fruits that had fallen during the night immediately after sunrise, and, pulling every fruit which I saw by the exudation of the juice had been punctured by the fly, had them all carried to the pigsties in bucketfuls, until all had been destroyed. We had not a single sound fruit that year. I found that the fruit of the wild goose plum and the persimmons, although punctured and falling like the other fruit, never contained a single live maggot. The result of the precautionary measures taken in 1896 caused our garden to be entirely free from the fly, and in 1897 we did not lose a single fruit. It is gratifying to read of the discovery made by Mr. Luke Gallard, in New South Wales, of a natural enemy of the fruit fly. This he considers to be one of the Braconed Wasps, and it performs the cure by depositing its own eggs in the body of the maggot of the fruit fly.

The main remedy at present consists in putting into force the powers provided under the Diseases in Plants Act.

An improvement is required in the Act, in order to make it provide the funds for carrying on the work and paying for the necessary machinery by applying all fines levied as penalties under the Act for that purpose. In other respects the provisions of the Act are ample, and if put into force vigorously the fruit fly would soon be a thing of the past. Delay in this matter only means increased loss and increased expenditure when the matter is finally taken in hand.

The State of Massachusetts affords an example of the cost of getting rid of a pest called the Gypsy Moth, which for twenty years, like our fruit fly, had its full swing until in 1890 the State voted £5,000 to be spent in its destruction. In 1891 £10,000 was voted, and year by year the vote was increased until £40,000 per annum was spent before it was stamped out. It, therefore, remains for the Government to wake up the owners of this valuable industry to adopt means to save themselves from greater loss.

PINEAPPLE CULTURE.

By ALBERT H. BENSON, M.R.A.C.

PART V.

Having dealt in the previous parts of this article with matters relating to the production of pineapples, I now come to the question of handling and marketing the crop when grown. This involves a careful consideration into the stage of ripeness at which to gather the fruit, methods of gathering and handling as well as of packing the fresh fruit for local, Australian, and oversea markets. The question of utilising surplus fruit by means of canning, pulping, crystallising, &c., will also be dealt with, as this is the most important question that the pineapple-growers of this State have to face to-day; as, until they are in a position to utilise surplus fruit to the best advantage, and thus relieve gluts and keep up the price of fresh fruit, the industry will not attain the position that the suitability of our soils and climatic conditions for the growth of the fruit entitles it to.

GATHERING THE FRUIT.

In the first place, this requires a knowledge of the exact degree of ripeness at which the fruit should be pulled or cut, as if gathered too soon the fruit never develops its full flavour, and if allowed to become too ripe before being gathered the fruit loses its peculiar piquancy of flavour, and becomes flat and insipid.

The best state at which to gather the fruit is when it has become fully developed, and this stage is known by the pips being well filled out from the base to the crown, and by the base pips being partly coloured. The fruit will now have developed sufficient sugar to ripen up fully without fermenting, and to get its right colour. The above is the right condition at which to gather for all markets outside the State to which the fruit has to be sent without cold storage, and is the stage at which most growers prefer to pick the fruit for their own eating. For purely local markets the fruit may be allowed to become riper and even fully coloured, but in no case should it be allowed to become overripe.

Overripe fruit loses flavour, often develops a burnt-sugar taste, and the texture of the fruit is also much deteriorated. It becomes very soft and tender, is easily bruised, and, consequently, will not keep or carry well; and, further, it will not stand cooking as well as fruit gathered at the right stage—a very important factor when canning or otherwise preserving the fruit.

The fruit is either cut or broken from the plant, taking care not to injure it in any way, as bruising the fruit is the surest way to set up decay. Personally, I am in favour of cutting the fruit, not breaking it off; using a

heavy straight knife, having a blade of from 18 to 20 inches long and a couple of inches wide, as this will enable the fruit to be cut well down below all gill sprouts. It is much easier on the hands than breaking the fruit off, especially when gathering rough-leaved pines.

The stem is again cut off at from half an inch to an inch from the base of the pine, and the fruit placed in baskets, which are conveyed to the packing-shed without bruising the fruit. When gathering the fruit be careful to cut or break the stem well below the gill sprouts, as if these are left on the old stem they soon form a dense mass of growth of no good for anything except the production of new plants. Breaking off the fruit is apt to injure the base of the fruit somewhat, which is a disadvantage when the fruit has to be kept any time. The difficulty of removing the gill sprouts at the base of the fruit, or, rather, the trouble of removing them after the fruit has been broken off, makes breaking off the fruit inferior to cutting it in my opinion.

So far, many of our growers have not been any too careful in the manner in which they gather their fruit, or handle it when gathered, and there is, in consequence, a good deal of bruising that must be avoided. The bruising takes place both in the plantation and also whilst the fruit is being carted to market, and will have to be entirely done away with before we can place our fruits on distant markets in the best condition.

Even in the journey to the Southern markets there is a great difference in the condition in which the fruit reaches its destination, and growers who have handled and packed carefully have made a name for their fruit, and realised satisfactory prices at the same time that equally good fruit, badly handled and packed, has been hard to dispose of at any price.

Every grower must recognise the fact that a bruised fruit is a spoiled fruit, and must learn to handle it better and more carefully, especially as with the greatly increased output which will presently take place buyers will be able to pick and choose, and you may rest assured that they won't take the bruised fruit. Even when picked firm, pineapples bruise easily, but if gathered at all overripe the pips are so tender that the least carelessness bruises them.

For local trade the present pineapple case is a suitable one, and is somewhat similar to the cases used in Florida. It measures 27 inches by 12 inches by 12 inches, inside measurement, with ends of 1-inch and top, bottom, and sides of $\frac{1}{2}$ -inch timber, and both smooth-leaved and rough-leaved pines pack well in it.

The fruit should be packed firmly, but not so tight as to press it out of shape, and the use of dry grass or other suitable packing material at the top and bottom of the case, as well as between the fruit, if it has to be sent any distance, is advisable. This case will, in my opinion, answer for shipping to New Zealand, Tasmania, or Western Australia, but for those markets I would recommend extra care and the wrapping of each fruit in two thicknesses of soft paper, such as unprinted newspaper, as it will tend to keep the fruit fresher as well as to prevent bruising to a great extent. For exporting beyond Australasia I am of opinion that a different case will be necessary—viz., one just deep enough to hold one layer of fruit—say, not more than six 8-lb. smooth-leaved pines to the case, and that each fruit should be wrapped first in a soft absorbent paper, and then in one thickness of paraffin paper, the bottom of the case and all spaces between the fruit being filled with paper shavings, wood wool, or dry sweet corn husks. A layer of either of these materials should also be placed on the top of the fruit before nailing on the lid. Such a case should, in my opinion, be a tight one, as I do not consider ventilation necessary. Packed in this manner, and kept at the right temperature, under the right conditions, I see no reason why our fruit should not carry all right to the Western States of America, Canada, Cape of Good Hope, and Europe. Of course, the shipping of fruit to such distant markets requires extra care in handling and packing; but, given this, I see no reason why our fruit should not carry. A splendid object-lesson in the careful handling and packing

of tender fruits has recently been seen in our markets in the case of European plums, Japanese plums, pears, &c., that have been imported from California, and have reached these markets in better condition than the average of the same kinds of fruit grown in our own State, which have only undergone a journey of hours instead of weeks.

The question of opening up new markets for our pineapples, and also of fully exploiting the markets we have, is one well worth the careful attention of all growers. Take our own markets first: It is a well-known fact that even when we have a glut of pines—say, in the Brisbane district—that there is a shortage in many Western districts of this State even, and in the inland markets of Southern States pines at all times are looked upon as luxuries, and are out of the reach of the average consumer. A better system of distribution is badly wanted, as were our own immediately available markets properly exploited, I feel certain that we would be able to dispose of a much larger quantity locally than we do at present. As to opening up new outside markets, I am of opinion that we can place our pines on the markets I have mentioned in good order, provided that it is done properly. I am induced to make this statement in that some ten years ago, when I was an officer of the New South Wales Department of Mines and Agriculture, I was in charge of a series of cold storage experiments, conducted for the purpose of determining the temperature and conditions best adapted for keeping many kinds of fruit. Amongst other fruit tested were pines, and the following extract from a report made by me, which appeared in the *New South Wales Agricultural Gazette* for December, 1893, shows the result of the experiment then carried out:—"The pineapples, which were of the small, rough-leaved variety, kept very well, and gradually ripened. The first ripened after being stored a month, but the rest kept well for six weeks. The fruit was packed in a single layer, with air all round it, and it ripened perfectly, the flavour being equal to anything I have tasted in the colony, either raised here or in the Islands, and was solid to the core. No discoloration of the core, so common in Island fruit, was present. The result of the experiment is very interesting, and should lead to further experiments being conducted."

At the same time Mr. Marshall, now manager of the Merinda Meatworks, Bowen, but then manager of the Fresh Food and Ice Company, Sydney, tried an experiment in the keeping of pines. The pines tested were purchased in the open market, were considerably bruised and overripe, with the result that every bruise turned black when kept in cold storage, a conclusive proof that if we are to succeed in keeping our fruit in perfect condition during a long sea voyage that it must receive very careful handling, be gathered at the right stage, and be packed in suitable cases. It may be interesting to state that the average temperature during the time the pines were stored was between 41 degrees and 42 degrees, and that the air in the chamber was always fresh and dry. As the fruit ripened at this temperature, even though it kept well for six weeks, I was of opinion that a colder temperature would be found better. This opinion I have recently had an opportunity of testing, as a number of experiments have been carried out at the cold storage works of Messrs. Trails Limited, Brisbane. These experiments have already extended over some four months, have included off-season and main crop fruit, both smooth and rough, in various stages of ripeness, and have shown the following:—

- 1st. Pineapples will stand a much lower temperature than that maintained in the New South Wales experiments.
- 2nd. Fresh dry air is essential.
- 3rd. Fully ripened fruit, well coloured, but still firm, and not overripe, keeps best.
- 4th. Main crop fruit keeps far better than off-season fruit.
- 5th. Careful packing is essential, bruised fruit turns dark.
- 6th. Fruit keeps in perfect condition for two months, fermentation and mould being prevented.

The result of these experiments is very satisfactory as, given the fruit at the right state of ripeness, careful handling, wrapping, and packing in suitable cases as already described, there is no reason, if similar conditions are maintained on shipboard to those maintained at Trails Limited, why our pines should not carry to any market in first-class condition.

For oversea markets only the best fruit should be sent, and smooth-leaved pines of from 6 to 10 lb. each in weight will probably be found most profitable, especially for the English trade. I have delayed the completion of this series of articles on pineapple culture in order to include the results of the recent experiments in cold storage, so as to bring the information right up to date. It is now for our growers to take advantage of the information gained, and to make a serious effort to secure the markets to which we have shown the possibility of sending our fruit successfully. In addition to the opening up of new markets for our fresh pines, both Australian and oversea, there is no reason why we should not have means of disposing of any surplus by means of canning, pulping, jam-making, crystallising, &c.

As far as canning is concerned, this has been already tested by several parties, but the results have not been too satisfactory. The fruit has not, as a rule, been well got up; it has been put up in water, the juice of other pines, or a very rich syrup, with the result that it compares very unfavourably with the Singapore article. The latter is well got up, and is put up in a syrup containing 3 lb. of sugar to the gallon, so that the fruit maintains its flavour instead of giving it up to the liquid in which it is cooled. Several kinds of pines are canned in Singapore; in fact, any pine large enough to fill a can is used, and they are put up in different-sized cans, and in different styles.

The cans are 1½ and 2½ lb., and the fruit is put up either in cubes, eyeless pines sliced, or sliced pines. All the fruit is peeled by hand, the cans are filled as full as possible, syrup is added, and after lid is put on, the fruit is processed and cooled in the ordinary manner. The present price of canned pines is low, and there is practically no sale for an inferior grade, so that the only chance for us in developing this industry is to put up nothing but first quality fruit in the best possible manner in a heavy syrup, and thus establish a reputation for highest quality which will enable us to obtain highest prices. As stated in an earlier part of this article, the high quality of our pines is recognised by all who have had an opportunity of comparing them with pines grown in other parts of the world, so that the quality of the fruit, when properly canned, should enable us to obtain a ready sale. Extra quality and get-up will sell canned goods even in a glutted market, so that if the canning of our pines is carried out on up-to-date lines I see no reason why the industry should not be a profitable one, and relieve our local markets of gluts such as we have experienced this present season. The pulping of the fruit is well worth testing, as this means of utilising the fruit would provide a market for fruit too small to can, or for crippled fruit unsuitable for canning.

Crystallising the fruit, though an operation requiring expert knowledge, does not necessitate any great outlay of capital, as a plant similar to that used for the manufacture of orange and lemon peel, which has been made very successfully in Brisbane, will answer the purpose admirably. The principle of crystallising is to extract all the moisture from the fruit and replace it by sugar, and this is done by first blanching the fruit and then placing it in a syrup of low density, and raising the density of the syrup daily till it is of sufficient density to crystallise on cooling. If the fruit is to be glacé it is dried rapidly when taken from the last syrup, but if it is to be crystallised it is dried slowly, so as to allow the crystals of sugar to form on the fruit whilst cooling. I am certain that the manufacture of crystallised pineapple can be made a paying industry, and am satisfied that a good market can be obtained in the United States, as American ladies are proverbial for their love of sweetmeats. The fruit should be crystallised in fingers or irregular shaped pieces, not in slices, and should be got up in the most attractive manner, when it will sell well.

In addition to utilising pines in the manner already described, the manufacture of cider, vinegar, and syrups for soda fountains might be combined with the canning, pulping, or crystallising of the fruit, so that all of the fruit could be put to some use instead of throwing away the core and peel, and so make a profit out of waste material. The question of improving and enlarging our markets, both Australian and oversea, as well as the question of utilising the surplus fruit is, as I stated at the beginning of this article, the most important question that the pineapple-grower of this State has to face to-day. I am satisfied that individual effort will do little if anything to relieve the situation, as, as long as every grower tries to run his business on his own lines, irrespective of what his neighbours are doing, things will not improve, but will go from bad to worse. The only solution of the difficulty is to place the industry on a firm business basis, this to be brought about by an active co-operation of all growers, and by their binding themselves to support one central organisation managed by first-class business men. Such an organisation would be in the position to open up new markets, to control and develop those which are here, to establish oversea markets, and to utilise all surplus fruit by canning or otherwise. In other words, a powerful combination of growers under smart business men to run the industry in an up-to-date manner.

Agricultural Patents.

PATENTS ACCEPTED.

7414: James Claude Henderson, of No. 46 A'Beckett street, Melbourne, Victoria, Australia, engineer, Walter James Anderson, of No. 59 William street, Melbourne, accountant, and Ernest Sydney Burman, of No. 59 William street, Melbourne, engineer. "An Improved Method of and Apparatus for Operating the Presser Plates of Cheese and other Presses." Dated 10th August, 1903.

7524: George Smith Duncan, of No. 1 Temple Court, Chancery lane, Melbourne, Victoria, Australia, civil engineer. "Improved Slime-filtering Apparatus." Dated 24th October, 1903.

7526: John Wright, of St. Heliers Bay, near the city of Auckland, Provincial District of Auckland, New Zealand, builder. "Improvements in Wire Fencing Standards and Battens." Dated 26th October, 1903.

7527: Patrick McCarthy, of Forest road, Bexley, New South Wales, Australia, joiner. "Improvements in Cooling Chambers for Meat." Dated 27th October, 1903.

7518: Leslie Harling McHardy, of Blackhead, Provincial District of Hawke's Bay, New Zealand, sheep farmer. "An Improvement in Wire-fencing Standards and Droppers." Dated under International Arrangements 6th June, 1903. Date of Filing, 19th October, 1903.

7519: Charles Jacob McPherson, of 30 Pine street, South Framingham, Middlesex County, Massachusetts, United States of America, manufacturer. "Cotton Gin." Dated 19th October, 1903.

7537: Anthony Edwin Watson, of Begg street, Kyneton, Victoria, Australia, farmer. "An Improved Scraper for Wheels or Discs of Agricultural Implements." Dated 2nd November, 1903.

7576: Mikael Pedersen, of Raglan House, Dursley, Gloucester, England, engineer. "Improvements in Cream Separators." Dated 27th November, 1903.

Apiculture

AUSTRALIAN HONEY IN LONDON.

It has been generally supposed that the reason for the low price obtained for Australian honey in the London market is the eucalyptus flavour, which is objected to by consumers. This is not altogether correct, because only a certain class of our honey carries something of this flavour. Yet our very best-flavoured and cleanest honey will only fetch about 2d. per lb. in the home market.

A London report on honey in London gives the real cause. The report says:—The best English honey is miles ahead of any other in flavour, and brings here 1s. per lb. Next comes New Zealand honey, about 45s. per cwt., retail 9d. to 10d. per lb., frequently sold as English. New Zealand honey is similar in colour to English, but not quite so good in flavour. The largest supply of honey comes from the West Indies, ranging up to 30s. per cwt. for best white; retailed at 7d. to 8d. per lb. Australian honey is very superior to this honey. The reason Australian honey does not sell is, because it is dumped into the auction mart and sold by the ton. When the beekeepers combine and send their honey to England to some retailer as an agent, properly grading the honey out there, and getting it put into suitable jars here, then, and not till then, will decent prices be obtained. Put on the market to be retailed at 6d. per lb., Australian honey will sell like hot cakes. At present it is not on the market; when it was, it was bought by the retailer at 2d. per lb., put into a pot, and sold at 10d. per lb.

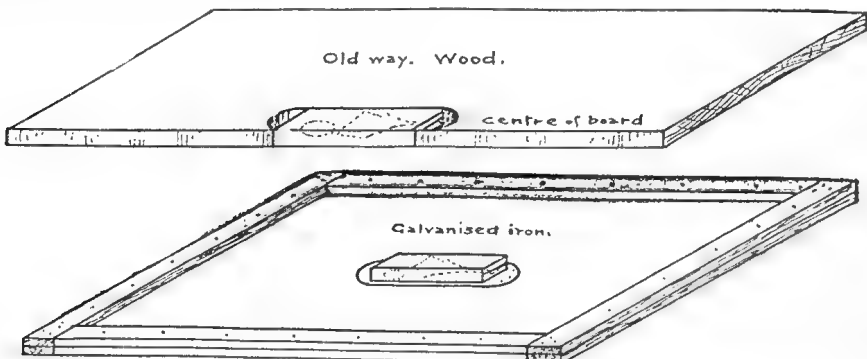
There is everything in the get-up of a canned or bottled article intended for export. Often inferior goods sell better than a higher class of the same kind, solely owing to the attractive appearance of the package and label and to the method of packing.

Only lately we noticed a report from London pointing out that although certain American apples are superior to the Tasmanian fruit of the same kind, yet, owing to the excellent grading and packing of the latter, and the splendid condition in which they arrive in Covent Garden, they command a far higher price than the former, which are squeezed into barrels for shipment.

Exporters and producers should make a keen study of grading, packing, and get-up of packages.

IMPROVED BEE ESCAPE.

As a good many beekeepers will soon be removing supers, Mr. H. R. Stephens writes: I would like to point out that an improvement on the usual method of fitting the Porter Bee Escape is—instead of using the usual $\frac{1}{2}$ -inch or so of timber, fit the escape to a piece of galvanised iron 20 inches by 16 inches, with the cleats sufficiently thick to clear the escape. The advantage is, that the springs of the escape are easily seen, and may be kept in order easier than in the old way when covered with propolis.



Botany.

CONTRIBUTIONS TO THE FLORA OF QUEENSLAND.

By F. MANSON BAILEY, F.L.S., Colonial Botanist.

Order TILIACEÆ.

SLOANEA, Linn.

S. australis, *F. v. M.* Add to description in *Ql. Fl.*, page 160: "Seeds 4 lines long, angular from being more than one in a cell, enveloped in a laciniate-reticulate, reddish-brown, fleshy aril; testa brown."

Hab.: Eumundi. Fruiting specimens received from *J. H. Simmonds*, February, 1904.

S. Woollsii, *F. v. M.* Add to description in *Ql. Fl.*, page 160, line 12 from bottom: Delete "turgid"; and add "4 lines long, closely enveloped by an almost entire cartilaginous, saccate crimson aril; testa nearly black."

Hab.: Eumundi. Fruiting specimens received from *J. H. Simmonds*, February, 1904.

Order MYRTACEÆ.

MYRTUS, Linn.

M. Becklerii, *F. v. M.* Add to description, page 649 of *Ql. Fl.*: "Peduncle 8 lines long, flattened in the upper part, bearing at summit 3 fruit, lateral ones on pedicels of 2 lines, central one sessile. Fruit yellow, glossy, globose, 5 to 6 lines diameter."

Hab.: Eumundi. Fruiting specimens received from *J. H. Simmonds*, February, 1904.

Order CUCURBITACEÆ.

TRICHOSANTHES, Linn.

T. subvelutina (underside of leaf velvety), *F. v. M.* in *Herb.*; in *A. and C. De Cand. Mon. Phan.* iii., 366. A tall climber, forming large heavy underground tubers, the principal stems often exceeding 1 in. in diameter, bark grey and more or less corky, the ultimate leafy stems or branches usually 5-ribbed and from 1 to 3 lines diameter, velvety-pubescent, leaves 3 to 5 in. broad, palmately 5 to 7 lobed, lobes acuminate sometimes sinuate lobed, the margins minutely denticulate, the upper surface dark-green covered with very short erect hairs, the under surface clothed with a dense, soft, grey villous-tomentum. Tendrils 3 to 5 branched, velvety. Peduncle of the male inflorescence strong, sulcate or ribbed, velvety, bearing from 6 to 10 flowers, 4 to 6 in. long, on strong, erect, shortly villous pedicels, 6 to 12 lines long. Bracts obovate-oblong, attenuated at the base, upper side somewhat scabrous, under side softly villous, 1 to 1½ in. long and ½ to 1 in. broad. Calyx-tube attenuated at base and apex, and densely hairy, nearly 2 in. long, and ½ in. broad; teeth spreading, linear, about 6 lines long and 1 line broad. Petals obovate, sparsely puberulous, 3-nerved, about 1 in. long and nearly as broad, fringe about as long as the petals. Stamens with subfiliform glabrous filaments about 4 lines long. Anthers slightly ciliate, about 5 lines long and 2 lines thick. Fruiting peduncle 3 in. long, 5 angular or ribbed. Fruit green, oblong-globose, often more than 4 in. long and 3 in. in diameter, 3-celled. Seeds very numerous, brown, rugulose, pyriform, with a white border, each enclosed in a loose, transparent skin, and embedded in the firm white substance of the fruit.

Hab.: Enoggera, Ithaca, and Samford Scrubs. I have frequently received fruit of the above plant, but, until Mr. Pye brought me specimens a few days ago of root foliage and fruit, I was unable to state to what plant the fruit belonged. Before this no description of the fruit has been published, except at page 703, *Ql. Fl.*, where it is given as the fruit of *Alsomitra suberosa*, for which I had received it without foliage from a correspondent who firmly believed it to be the fruit of that plant, whose fruit was unknown.

Order LAURINEÆ.

ENDIANDRA, R. Br.

E. Lowiana, *Bail.* Add to description, page 1307 of *Ql. Fl.*: "Fresh fruit yellow, $2\frac{1}{2}$ in. long, 2 in. diameter."

Hab.: Near Mt. Cooroy, *J. H. Simmonds*, February, 1904.

Order THYMELÆACEÆ.

LEUCOSMIA, Benth.

L. Chermsideana, *Bail.* Add to description in the *Ql. Agri. Journ.*, Vol. XIV., Part I., 35: "Fruit crimson, globose-ovate, $\frac{1}{2}$ in. long, 2-celled. endocarp cartilaginous."

Hab.: Killarney, *Jos. Wedd.* Fruiting specimens received February, 1904.

Order FUNGI.

ITHYPHALLUS, Fries.

I. operculatus (cap extinguisher-like), *Bail.* Height of plant, including volva, about $7\frac{1}{2}$ in. erect. Volva white, from oval to nearly globose, about $1\frac{1}{4}$ in. diameter. Mycelium white, scanty. Exposed portion of stem or that between the top of volva and the base of pileus 5 in., attenuated upwards, somewhat compressed, tapering from about $\frac{1}{2}$ in. broad at the bottom to $\frac{1}{4}$ in. at the top, hollow, lacunose and vermilion-coloured. Pileus conical-campanulate, about $1\frac{1}{2}$ in. high and $\frac{1}{2}$ in. broad at the base, thus hanging free and distant from the stem; externally rugulose and coloured like the stem, but bearing a thin, smooth dark-olive coating of the substance which bears the spores. Apex umbonate vermilion.

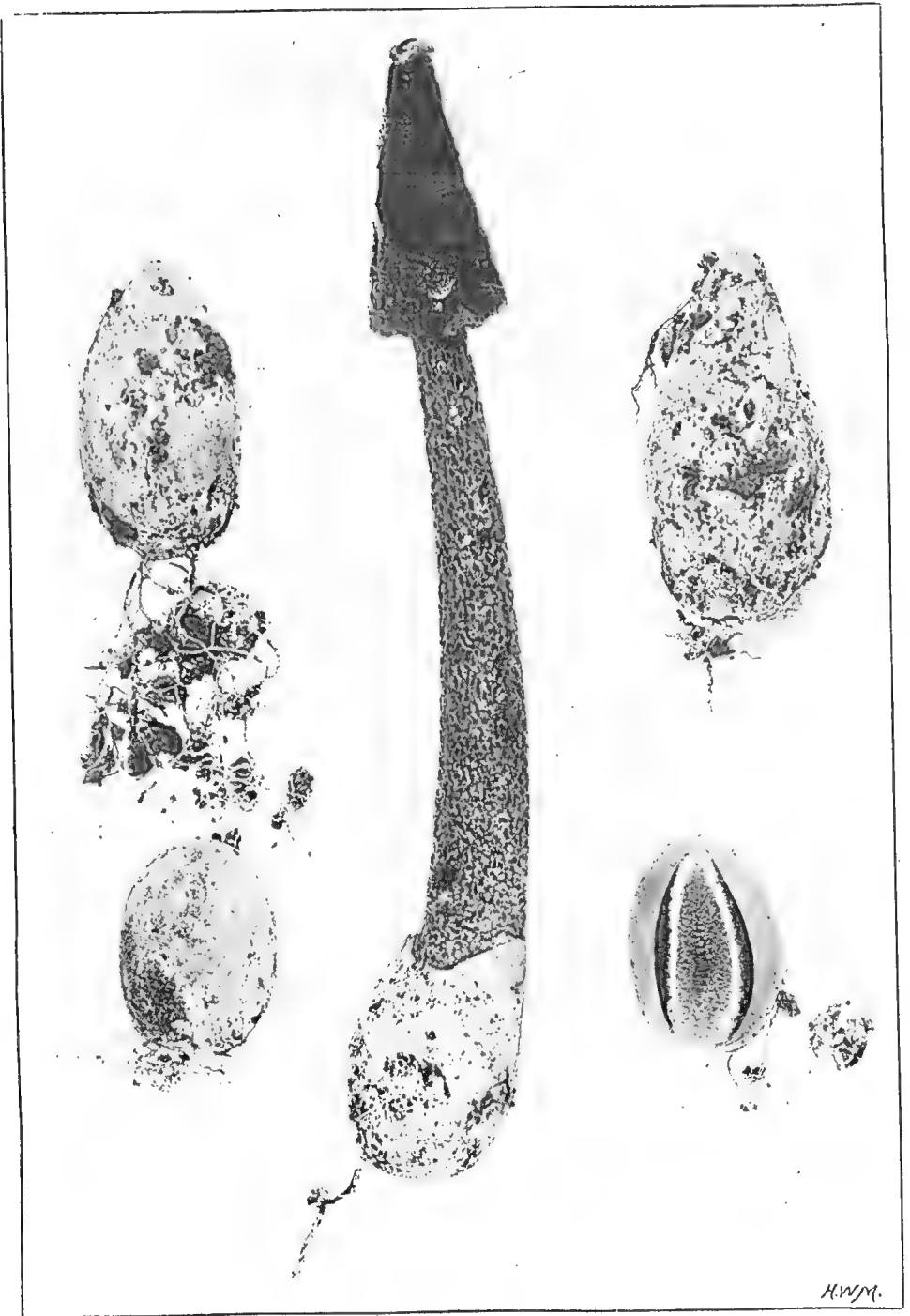
Hab.: In garden of *Mr. H. Tryon*, South Brisbane.

Plate No. XVI., showing various stages of development:—Lower 2 figures, volva before bursting and longitudinal section of same; the 2 upper figures showing the volva bursting at the top and the apex of the pileus appearing. The centre figure shows a mature plant of medium size.

THE WHEAT YIELD OF AUSTRALIA FOR 1904.

The wheat harvest towards the close of the great drought was the smallest relative to acreage sown ever known in Australia. The harvest concluded in 1904 was the record for the Australian Continent. The yields for the four wheat-growing States are:—Victoria, 25,000,000 bushels; New South Wales, 25,000,000 bushels; South Australia, 14,000,000 bushels; Queensland, 2,500,000 bushels; a total of 66,500,000 bushels, of which something like 40,000,000 bushels will be available for export. The value of this export is estimated at nearly £6,000,000 net. Of course these figures are only estimated, for the returns cannot possibly be available for some months. Still, they may be considered fairly near the mark, possibly under than over. Consequent upon the singular weather conditions, the harvest has been spread over a longer period than usual. This fact, coupled with the advantages offered by the grain sheds at Warwick, Clifton, and Tannymorel, in Queensland, has enabled the Railway Department to easily cope with the large quantities of wheat being sent to the Brisbane market. There is still a large quantity of wheat in the stack at Glengallan and in other centres, which will be late in reaching the market, but it is quite on the cards that good prices will be paid long after the last stack has been threshed.

Plate XVI.



Ithyphallus operculatus, Bail.

Viticulture.

BY-PRODUCTS OF THE GRAPE.

Whilst we hear and know a great deal about the by-products of cotton, maize, meat, &c., little has been thought, at any event, in Australia, of evolving any by-products of the grape, unless brandy may be so termed. In this connection the *Journal of the Department of Agriculture* of Western Australia says:—

The Californian Product Company's establishment has always been a kind of puzzle. Extensive and substantial buildings were erected, but the management maintained the strictest secrecy as to its operation, and everywhere were notices to keep out. At last, the company is prepared to let the public know a little of what it is doing, or, rather, what it is proposed to do, for the work thus far has been largely experimental. While the utilisation of waste products in the United States is an important industry, the manner and method of obtaining the by-products of the grape were new problems, to be solved after extensive experimentation. The experimental stage has now been gone through, and the company has all its formulas protected. It now proposes to begin on a commercial basis, and the industry promises to be a very important one for this country.

George W. Hooven, the president of the company, stated he had a number of samples of various by-products made from the waste of packing-houses and wineries. In a pamphlet, which he has just issued, he describes what it is proposed to manufacture, as follows:—

"The great fruit-growing State of California at this time presents a most inviting field for operators with sufficient technical knowledge and capital to utilise the by-products or waste materials obtainable from its fruit packing and seeding plants and its wineries.

"In 1902 the Californian grape crop yielded 96,000,000 lb. of raisins and 40,000,000 gallons of wine. In the single county of Fresno the grape crop of 1900 realised 4,429,000 dollars (£885,800). These grapes were made into wine or raisins, and the larger part of the raisins were seeded. If the utilisation of the waste from this crop produced values proportionately as great as came from the packing-houses or the degreasing of wool—and such results are quite feasible—it would mean over 500,000 dollars (£100,000) worth of by-products from the waste of one year's grape crop of the country.

"The Californian product plant receives annually from the raisin seeding and packing companies thousands of tons of grape seeds and other waste, from which it manufactures alcohol, and from which it will manufacture an oil similar to olive oil, suitable for table purposes, and now used in Europe. This also has the properties of a drying oil, and can be used as a substitute for linseed oil. It will saponify, and can be used in the manufacture of fine toilet soaps. From the residuum tannin extract will be manufactured, and disposed of in the tanneries for the treatment of leather. After these products are taken out, there remains a fine chocolate-like meal that is excellent cattle food.

"This plant also receives from the large wineries thousands of tons of pomace, or more, that are left after making wine from the grapes. This material is dried, and the seeds separated and put to the same use as the raisin seeds. The pulp and skins yield cream of tartar and tartaric acid. The process of drying produces from 50 to 60 per cent. of the weight of the pomace in a vapour, which will be condensed to yield acetic acid, of which it contains from 5 to 10 per cent. Various commercial acetates will be produced from the same source. They are regarded as very valuable products. The residuum will be submitted to destructive distillation to yield vegetable black, known as 'Frankfort black,' and crude pyroligneous acid and its products, the same as are produced in the manufacture of charcoal.

"Even the grape stems will be utilised. When shredded they have the appearance and character of hemp or jute fibre, and they undoubtedly form a basis for a very fine paper stock; and in this connection we would draw attention to the many attempts and final success in finding a process for converting the black, useless hulls of cotton seed into a valuable paper stock.

"The United States secures most of its present supply of tartar from France, Italy, and Germany, the importations amounting to about 3,000,000 dollars (£600,000) annually, all manufactured from the waste and argols obtained from wineries.

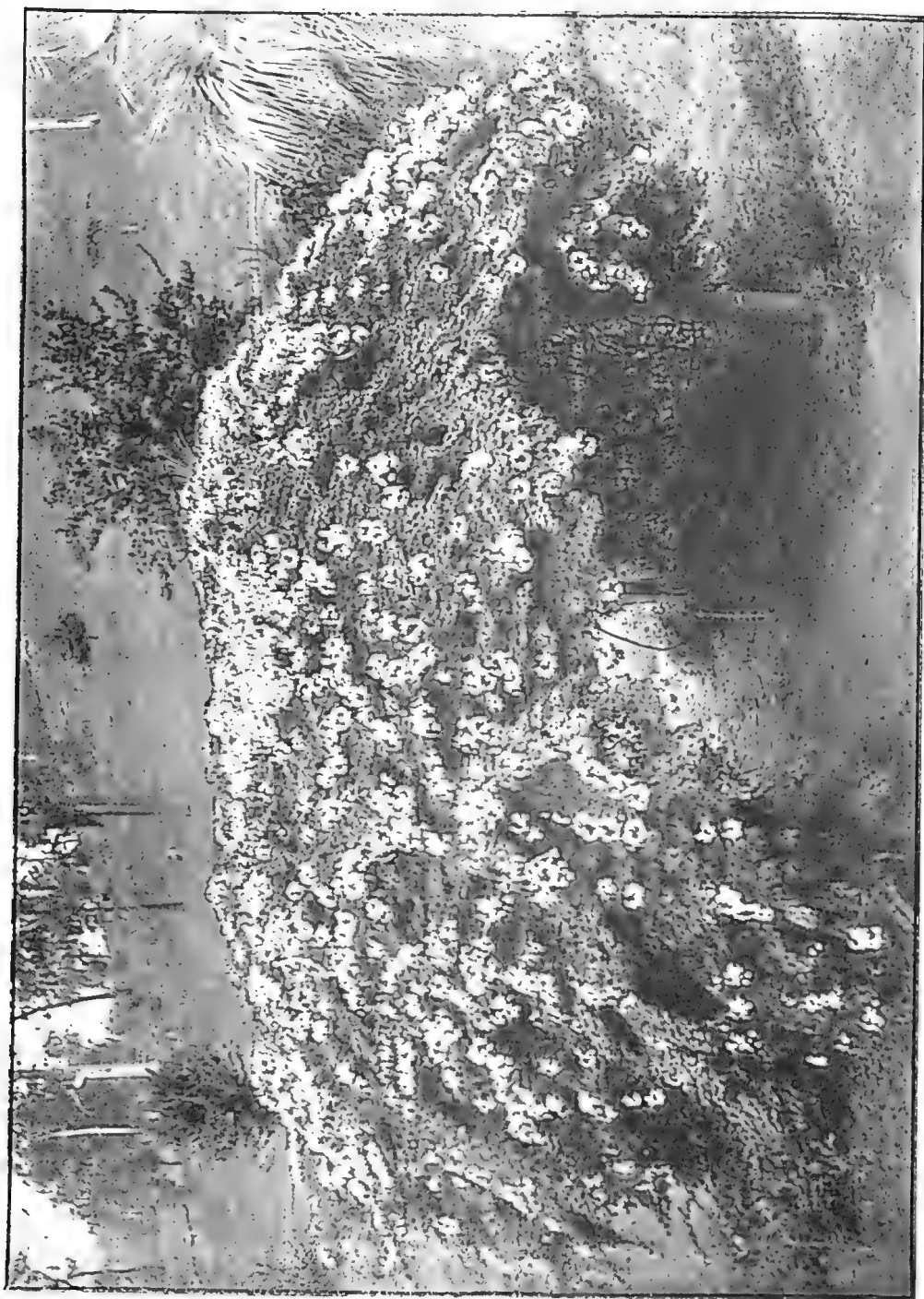
"The pomace or waste obtainable from the wineries in California is richer in tartar than the same material obtainable from the wineries in Europe. This is due to the large amount of potash in the soil of California. Even the seeds in the Californian grape are larger and more numerous than the seeds obtained from the European grape. This is a local advantage, paralleled in the cotton-seed industry, for the seed of American cotton is larger than that in the cotton of Egypt and India."

SISAL HEMP AT ST. HELENA PENAL ESTABLISHMENT.

Visitors to St. Helena have often inquired what was the idea in planting long lines of aloes round the island. These aloes are the *Agave rigida*, or sisal hemp plant. For particulars of its cultivation we refer our readers to an article in this issue of the *Journal*, and to a previous exhaustive article on the subject by the Agricultural Adviser, Mr. P. McLean, in the November number of the *Journal* for 1897. Several persons in various parts of the State are now turning their attention to the cultivation of the plant for fibre production. Lately, a very fine sample of fibre was prepared at St. Helena, and was forwarded by this Department to Messrs. James Miller and Co., Melbourne, manufacturers of rope, twine, matting, &c. The report of that firm was received early in March, and is to the effect that they are delighted with the samples of sisal hemp forwarded to them. One sample was prepared from the variety of Agave known as the *Fourcroya gigantea*, which has spines on the edges of the leaves. The second sample was from the *Agave rigida*, var. *sisalana*. The report states that there would be no difficulty in obtaining from £30 to £35 per ton for the fibre, according to quality, and there is an opening in Victoria for at least 2,000 tons a year of this material. It could be largely used for the manufacture of binder-twine in all the States. Messrs. Miller and Co. hope that the industry will be pushed ahead in Queensland, as in a very few years there would be an annual paying crop assured. They mention that sisal is practically a modern fibre, and to show its great importance in the world's fibre consumption it is stated in Messrs. W. F. Malcolm and Co.'s hemp report for last year the consumption of sisal hemp is put down at 610,000 bales, being an increase of 74,000 upon previous year. Manila and New Zealand hemp are just now very high in price, and, as it is evident that the world's demand for fibre is greater than the production, there is clearly an opening; and in this direction Queensland could do much, provided the necessary labour is procurable. The report concludes with an assurance of a ready market for all the hemp which can be produced here.

This surely should encourage farmers to grow the sisal hemp plant in suitable localities. Scarcely any cultivation is needed during growth, and hence labour is wanted only when the cutting begins. We do not think that much difficulty will be experienced in this direction. The necessary cleaning machinery is fairly cheap, and should not prove an obstacle in the way of a product which will yield a gross return of from £30 to £35 per acre. Deducting 50 or even 60 per cent. for labour, there still remains a net return far in excess of that derived from ordinary farm crops which require resowing every season, whereas the sisal plant, once placed in the ground, requires no replanting or cultivating.

Plate XVII.



Bauhinia Scandens.

Horticulture

TWO SHOWY BAUHINIAS.

By J. F. BAILEY, Assistant Botanist.

The name *Bauhinia* is familiar to all those who devote attention to gardening, as it includes many species of striking beauty. The name was given by Father Plumier (a monk who paid great attention to botanical matters, and who first discovered that garden favourite of the present day—viz., the fuchsia) in honour of the two brothers, John and Caspar Bauhin. It is said that Plumier selected these plants for commemorating the work these brothers had done in the cause of horticulture on account of the two leaflets being so frequently united by their inner margins and forming a simple leaf. The genus is not so extensive as many others of the same natural order—Leguminosæ; but the species are scattered throughout many warm countries. A large number of them form handsome flowering shrubs or small trees, like *B. variegata* and its variety *candida*, which are extensively grown in our gardens and parks. The wood of the tree-growing species is ornamental and durable, while they also furnish tanning barks and strong fibre. The two, however, which it is desired to bring under notice—viz., *B. corymbosa* and *B. Galpini*, of India and South Africa respectively—are what are termed shrubby climbers; that is to say, they grow in a somewhat similar manner to the *Bougainvillea*.

The first-mentioned, which is sold here under the name of *B. scandens*, has been a favourite in our gardens for many years, and the accompanying plate, which represents a plant growing in Mr. W. H. Parker's garden, at Enoggera, shows how well adapted it is for garden decoration.

B. Galpini is an introduction of recent years, and is not so familiar to us. It is, however, in quite a number of our gardens, and when it becomes better known will be a common object in most of them, for the beauty of the flowers and the floriferous habit of the plant entitle it to a place in the front rank of this class of plant. For some reason, which the writer has been unable to find explained, this plant is called by our gardeners *B. carnea*, but one can hardly imagine such a name being applied to a scarlet-coloured flower.

The propagation of these species is by cuttings, layers, or seeds. *B. corymbosa* does not seem to seed freely here, but *B. Galpini* produces them in abundance.

The seeds, before being sown, should be treated in the same manner as it is customary to treat acacia seeds. They should have boiling water poured over them, and be allowed to stand until water is cool. This will crack the enamel-like substance with which they are coated, and allow the moisture to get to the embryo or germinating portion. Sow half an inch deep in shallow boxes or pots of soil composed of sand and well-rotted leaf-mould. Keep the soil always moist, but not sodden. In filling the box, give plenty of drainage—broken brick or charcoal serve well for the purpose—and, if handy, mix with the soil a quantity of cocoanut fibre dust. This will have the effect of causing the young plants to form a greater quantity of fibrous roots, which will be advantageous to the plants when taken out of the boxes for planting out.

Layering is a method extensively adopted for increasing this class of plants, and may be performed during the spring and summer months. After deciding on the branchlet to be layered, make a tongue by cutting just below one of the buds on the upper side of the branchlet, and draw it upwards for about an inch. While doing this the branchlet must be held steadily with the hand not engaged in cutting. Before placing it in the soil, allow the tongue so formed to project a little over the edge of the branchlet. After placing in position and before filling in the hole made for receiving the branchlet, put some light soil over the tongued part, then fill in the rest of the soil, press the whole down firmly, and on the surface place a brick or stone, either of which

retains moisture in the soil beneath better than if a peg is used. When it is intended to layer a plant, the ground around should be well broken up, and, if convenient, a coating of compost, similar to that used for potting plants, added to the soil, which should always be kept moist, so as to encourage the process of rooting.

In passing, it might be mentioned that five species of *Bauhinia* are indigenous to Queensland, and are all objects of great beauty when seen growing in their native habitats. *B. Hookeri*, which is to be seen in the Brisbane Botanic Gardens and Acclimatisation Society's Gardens, forms a handsome plant, both the flowers and foliage being very attractive.

AN IDEAL SUGAR-CANE.

POSSIBLE REVOLUTION IN THE PRODUCT OF LOUISIANA.

It will probably interest cane-growers in Queensland to learn that a New Orleans journal suggests the possibility, if not the probability, of a great improvement, not only in the weight of the cane crop, but also in the sugar content of the juice and the percentage of juice extractable from the cane. The *Southern Farm Magazine* reproduces a report published in a Southern exchange on this subject, which states as follows:—

It is announced that Dr. William C. Stubbs, director of the Louisiana experiment station at Audubon Park, has developed a sugar-cane which is capable of yielding 30 per cent. more sugar than the cane now grown in the State. In an interview with the *New Orleans Times-Democrat* Professor Stubbs says:—

"Six years ago we received a large number of various canes from Trinidad. We promptly began to experiment. We tried to ascertain which cane was best adapted for this climate. We made a score or more experiments and carefully compared the results. We wanted to get a cane that would find ready and congenial growth here in Louisiana, and that would at the same time increase the sugar output for the acreage in this State.

"I am delighted to say that our patience has at length been rewarded. We now have two kinds of cane that are highly successful. They are unquestionably a great deal more satisfactory than the best cane known here for many years. In my opinion, they are the most valuable canes that can be grown in Louisiana soil. They make what our agricultural experts call an ideal specimen. We have classified them as 'T. 95' and 'T. 74.'

"To the lay public there is nothing exceedingly significant in those words 'T. 74,' but to the sugar-planter they will be nothing less than startling. This cane produces 38 tons to the acre. The juice yields 16 per cent. of sugar. Under a nine-roller mill 81 per cent. is obtained without saturation.

"If you will compare these figures with statistics of cane now grown you will realise that this new cane will revolutionise the sugar industry in Louisiana. The old cane gives an acreage of 20 to 30 tons, with a 12 per cent. yield in the juice. Under the roller it gives a percentage 71.

"The new cane is long-jointed, green, perfectly healthy, and beautiful in appearance. It has an excellent stubble and remarkable vigour. It withstood the terrific gale that swept over the city on 9th and 10th September. It is deep-rooted and strong, and was the only cane in the field that was not blown either flat or partly down to the ground. It was not damaged the least bit by the storm.

"We are ready and willing to furnish this cane to any planter who may apply for it. We expect to send out more than 500 bundles in the next few weeks. Requests for the cane are coming in on every mail. We shall begin to ship the cane in a few days. Planters throughout the State show intense interest, and have strong faith in the new specimens. We shall send some of the cane to the experiment stations in Cuba and the Hawaiian Islands."

Tropical Industries.

COTTON CULTIVATION, No. 2.

By A. J. BOYD.

COTTON GINS.

Should the cotton-growing industry again be on a firm basis in Queensland, it follows that many ginning-houses will be established in the principal centres of industry. These establishments will probably all instal the saw-gin, owing to the rapidity with which they work. But it should be remembered that, while the saw-gin is quite suitable for cleaning the short-stapled Uplands cotton, it injures the Sea Island and long-stapled Uplands by tearing the fibre and turning out a very uneven sample. For the long-stapled cottons, the roller-gin is a necessity. In my gin-house I used roller-gins for all cotton, and realised the highest prices in the British market. The roller will not get through as much work in a day as the saw, but the sample of clean lint turned out is infinitely superior, and condensers are not required as in the case of the latter machine, the lint rolling out in a broad sheet, which can be almost folded up and dropped flat into the bale. As far as home-ginning on the farm is concerned, unless a farmer has from 20 to 50 acres, it would not pay him to go to the expense of erecting a gin-house and installing a gin, engine, and boiler. Certainly he could run a gin by horse-power, but this is slow work, and harder on a horse than chaff-cutting. There are hand-gins which can be obtained for from £3 to £5, but they would be useless for a reasonably large crop. The cost of ginning is but $\frac{1}{4}$ d. per lb. of seed cotton, and as the work is done at the gin-houses by up-to-date machinery it would scarcely be worth a farmer's while to undertake the work himself. He can always sell his seed cotton at a remunerative figure to city merchants or their agents in the country, and he will find it much to his advantage to do so. A cotton gin with condenser costs 15s. per saw, and the gin would cost from £25 to £50, according to the number of saws.

In the Sea Island cotton districts of the United States, from South Carolina to Florida, the roller-gin is in almost universal use. The gin most favoured there is the Pratt roller-gin. The McCarthy roller-gin is almost exclusively used in Egypt. There will be no difficulty in obtaining cotton gins in this State once the industry is fairly started. There are makers in most of the Southern States of America who are only too anxious to dispose of their goods. The Bailey-Lebby Company, of Charleston, South Carolina, make a small hand-gin, known as the "Mann IXL." It is a roller-gin, and works satisfactorily on a small scale.

THE PRESENT POSITION OF THE COTTON INDUSTRY OF THE WORLD.

The principal cotton-growing countries of the world are—The Southern States of America, Egypt, South America, the West Indies, India, Japan, China, Persia, Central Asia, &c.

Japan consumes practically the whole of the Chinese export—about 36,500,000 lb. In Central Asia, Russia has not yet grown sufficient cotton for home consumption. Two-thirds of the Persian crop is exported to India and Russia, say about 10,000,000 lb. India exports about four-ninths and the United States about two-thirds of the cotton raised in those countries. Egypt exports her whole crop, amounting to over 500,000,000 lb., nearly half of which goes to Great Britain. The cotton crop of India amounts to about 3,500,000 bales, and that of the United States to nearly 12,000,000 bales. The production of foreign countries in competition with the United States in the production and export of cotton amounts to about one-third of the production of the world.

Cotton-mills have increased to such an extent in the United States that the home consumption has risen to nearly 4,000,000 bales. The British mills consumed nearly as much, and on the Continent cotton-spinners account for more than either of these countries. As a consequence of the increasing consumption of cotton by the American mills, a corresponding decrease has occurred in the exports, the result being that the Lancashire spinners have had to restrict their output, and only lately 15,000 looms in Lancashire have been thrown out of work. During the last century, whilst the increase of consumption of flax increased about twice, that of wool increased by five times, and that of cotton by no less than thirty-nine times. This enormous increase in the amount of cotton used has been due to various causes. New markets have been found for cotton goods, and many races who formerly went unclothed now wear cotton fabrics. The total world's consumption of cotton has increased threefold during the last fifty years, and that increase is still going on. In January, 1904, enormous orders for cotton goods were placed in England from Japan, possibly in view of probable war between that country and Russia.

THE FUTURE DEMAND FOR COTTON.

With regard to the future demand for cotton, Mr. Watkins, Cotton Expert of the United States Department of Agriculture, says:—

It is estimated that, of the world's population of 1,500,000,000 about 500,000,000 regularly wear clothes, about 750,000,000 are partially clothed, and 250,000,000 habitually go quite naked, and that to clothe the entire population of the world would require 42,000,000 bales of 500 lb. each. It therefore seems more than likely that the cotton industry will go on expanding until the whole of the inhabitants of the world are clothed with the products of its looms. This is not an unreasonable conclusion when we consider the fact that cotton is the cheapest material for clothing known to man.

It is highly improbable that the supply of cotton will ever exceed the demand, hence there is every reason to hope that, in view of the present scarcity of the textile, a scarcity which is likely to be intensified in the near future, Queensland will make strenuous efforts to share in the production and export of a product for which the world's markets are always open at remunerative prices.

Already, by the efforts of the British Cotton-growing Association, cotton-growing in the West Indies is rapidly increasing. In the Leeward Islands alone there are over 500 acres under cotton, and in St. Kitts 324 acres were planted in 1903.

Both in British East and West Africa cotton-growing is being taken up, and the owners of the steamship line, John Elder and Co., have offered to carry 1,000 tons to England, free of charge, for the next three years. I believe the first cargo of cotton sent by this line has already reached England.

Thus it will be seen that there is a bright future before the cotton-grower in all British countries.

I will not here deal with the commercial aspect of the business—that is, the matter of export, freights, duties, commissions, &c. With these the farmer has nothing to do. His sole business is to grow the cotton and sell it to the merchant, who gins it and exports it. All that concerns the farmer is the price, and from all appearances the price is likely to be good enough—in fact, is already good enough—to induce every farmer in our cotton belt to at once get ready for September or October planting.

THE PRICE OF COTTON IN THE QUEENSLAND MARKET.

was ruled by the price of cotton in England. When the home price fell from 1s. 6d. per lb. to 6d. per lb., the farmers felt the fall as much as the buyer, for the latter, in order to make any profit, was compelled to reduce the price of seed cotton. Many people fall into the error of thinking that the cessation of the bonus was the cause of the decline and final abandonment of the cotton.

industry in Queensland. This is quite a mistaken notion. The reason for the abandonment of the industry was the tremendous fall in prices, a year or two after the close of the American Civil War, when clean lint was only bringing 9 cents (3d.) per lb. It was impossible to grow cotton in Queensland in the face of such a price in the English market. The farmers, therefore, gradually abandoned the business, taking it up again, however, on the establishment of

A COTTON-MILL

at Ipswich. The directors of this concern did all they could to encourage the farmers to produce cotton, and to establish a valuable industry in the colony. I believe that want of sufficient capital caused the mill to close down eventually. I am not familiar with the history of this venture, and am, therefore, not competent to discuss it. This, however, I think, will not be disputed: The mill and machinery are ready to go to work again at any time when capital and the raw product are forthcoming. It seems reasonable that there should be the means in Queensland of producing the cotton goods which are now imported into the State, and for the manufacture of which the raw material grown here has to be shipped to the other side of the world, only to be shipped back again in another form.

THE VALUE OF COTTON SEED.

It might be thought that the farmer who merely sells his seed cotton and has then no further interest in it, will not be interested in what becomes of the seed, which, in former days, the purchaser threw away as useless. To-day, the farmer has every reason to be interested in the seed which he has sold together with his cotton. What is apparently of no value in the farmer's eyes is now worth from £4 10s. to £7 per ton accordingly as it is in the rough state or decorticated. Every 1,000 lb. of seed cotton, the produce of one acre, sold to the merchant contains 600 lb. of seed, worth from £1 4s. 1d. to £1 17s. 6d. The value of this seed, together with 30 lb. of short lint (called "linters") obtained from each ton of seed cotton, must influence the price paid to the farmer for his crop. The short lint which is taken off the seed of some varieties of Uplands cotton is worth, on an average, £3 per ton. Again, when the seed has been re-ginned to save the short lint not removed by the first ginning, it is run through machines which separate the hulls from the kernels. One ton of cotton seed yields nearly half a ton of hulls. These hulls are mixed with cotton-seed meal, and form a superior food for stock, and there is a steady demand for the entire supply. The hulls are worth 12s. 6d. per 600 lb. of seed. Then we have another by-product—the oil. The kernels, as I have said, constitute about one-half the weight of the seed, and these kernels yield 30 per cent. of their weight of oil. Still working on the basis of 600 lb. of seed per acre, the 300 lb. of kernels will yield 12 gallons of oil, or about 90 lb., worth 20s. per cwt. in its crude state, or about 16s. for the 12 gallons. But we have not yet done with the by-products of the crop. After the oil is expressed, there remains the oilcake, which represents 210 lb. This oilcake has a high feeding value for stock. At the low price of £5 per ton, 210 lb. are worth nearly 10s.

Now these are all factors which to-day make for a fair price for seed cotton. Summing up the various items, it will be observed that the sale of the seed cotton includes the sale of seed of a minimum value of £1 4s. 1d. Let us see what the purchaser gets out of both cotton and seed:—

				£	s.	d.
Long lint, 400 lb. at 6d. per lb. ...	...	...	...	10	0	0
Short lint, 30 lb. at 3s. per cwt. ...	...	...	...	0	0	9½
Hulls, 300 lb. at 2s. 5d. per cwt. ...	...	...	...	0	6	5½
Oil, 12 gallons at 20s. per cwt. ...	...	...	...	0	16	0
Oilcake, 210 lb. at 5s. per cwt. ...	...	...	...	0	9	4
				<hr/>		
				£11 12 7		

Thus, for every 1,000 lb. of seed cotton which the buyer obtains for £8 6s. 8d. (at 2d. per lb.), he gets £11 4s. 1d. if he sells the seed, or £11 12s. 4½d. if he decorticates it and works it up into hulls, oil, and cake—a profit of £2 17s. 5d. and £3 5s. 8½d. respectively per bale of 400 lb., out of which he has to defray the expenses of ginning, pressing, baling, packing, shipping, &c. The actual net profit to the ginning establishment depends upon three things. First, the price of clean cotton in the home markets; secondly, the price at which the seed cotton can be purchased from the farmer; and, thirdly, the quantity of clean lint he can turn out and pack daily. There are certainly other factors to be considered, but these are the principal ones. An Eagle saw-gin of from 30 to 100 saws will gin on an average 1 bale of 440 lb. clean lint for each 10 saws in 12 hours. Consequently, a 100-saw gin will turn out 10 bales, equal to 4,400 lb., or nearly 2 tons in a day of 12 hours. These gins cost about £1 per saw. The engine-power required to drive them is given as 1-horse power to every 15 saws. The addition of a condenser to the cotton gin would raise the price of the machine by from £5 to £10. The cotton as it leaves the gin would fly out like a snowstorm, and settle in a light, fleecy heap on the floor of the gin-houses, but, by means of what is called a “condenser,” it leaves the gin in a compact sheet, which lies folded on the floor, and is then easily picked up and put into the bale, which hangs ready open in the press. Presses are of various kinds. Some screw-presses are worked by hand-power, others by horse-power. When pressing cotton into the bale, the object to be attained is, such strong pressure that no moisture can be absorbed from the atmosphere, and also the reducing of the freight charges. In Queensland 400 lb. are pressed into one bale, and on arrival at the port of shipment two of these bales are “dumped” into one, and secured with iron hooping. They are then ready for shipment. Sea Island cotton will not stand such great pressure. It is therefore “tamped” into the bale, either by hand, with wooden beaters, or by a tamping machine.

COTTON-PICKING MACHINES.

Several cotton-picking machines have been invented in various parts of the world, one of which was expected to solve the question of hand labour. It was a machine which was provided with brushes and rolled over the cotton—that is to say, two discs were fastened to an arched attachment, enabling the discs to run on both sides of the cotton plants. The theory was that the brushes would tear the cotton from the bushes, the cotton being subsequently carried away to a receptacle by combs. This machine, however, proved a dead failure. The latest and most approved patent is a pneumatic machine worked by powerful suction, somewhat on the principle of the sheep-shearing machine. The machine passes along the cotton-field, one man on each side of the trolley from which the suction power is conveyed. Briefly speaking, this machine consists of one or two more pneumatic tubes, which, when presented to a perfectly ripe cotton boll, immediately suck it into a receptacle in rear of the power. (It has been stated in American papers that this machine will perform the work of cotton-picking in one-hundredth part of the time formerly required by hand-pickers.) Nothing further, however, has been heard of this invention, and the man has yet to come along who can solve the question of cotton-picking by machinery. I am informed by an American gentleman, who was in the Southern States at the time when this machine was invented, that it proved valueless, although it worked to perfection and at great speed. The difficulty about it was, that the powerful suction drew out not only ripe but unripe cotton. The consequence was that the bulk of the crop heated and damaged the sample. He further said that, in order to utilise the machine, it would be necessary to evolve a cotton which would all ripen at once, as is the case with cereals. If that can be done, the pneumatic machine would prove of enormous value. The United States Department of Agriculture has spent some £50,000 in experiments with cotton-picking machines, and one firm alone spent £5,000, and at last gave up experimenting.

SOME DISEASES OF THE COTTON PLANT.

The preceding remarks on cotton-growing are of more interest to the buyer than to the grower of seed-cotton. I will therefore return to the more immediate subject of this paper—the production of the crop, and some of the difficulties in the way. In all cotton-growing countries certain diseases and insect pests attack the cotton plant, either in the root, stem, leaf, or boll, against which pests the cotton-planter has to wage continued war. First, we have the cotton worm (*Aletia xyliana*), which is common in America. It belongs to the same family (Noctuidae) as the silkworm, and I may here remark on the singularity of the fact that one member of this family supplies us with that most valuable textile—silk—whilst another compasses the ruin of an equally important textile—cotton; and whilst human science exhausts itself in the study of improving and increasing the former, it almost vainly battles in the destruction of the latter. The cotton-worm moth lays its eggs singly on the underside of the larger leaves, where they are not easily discovered. Two or three days after the eggs are laid the caterpillars are hatched, and for a few days they scarcely move from the spot on which they were hatched, feeding on the surface of the leaf, which is soon mottled with yellow, semi-transparent spots. These spots betray their presence. They cast their skin five times, and in the course of from two to three weeks attain their full growth. It is during the last two days of their existence that they devour more than in all the previous time since hatching out. Then they spin a light cocoon and become chrysalides, and remain in this chrysalis stage for a week in summer and for three weeks in spring and autumn. Half a dozen of these caterpillars suffice for the total destruction of one healthy cotton bush, and as the female moth is so prolific that in two summer months her descendants reach a total of 20,000,000,000 it will be seen what a terrible scourge menaces a cotton field. Unless Nature had provided some means of circumscribing the increase of the pest, cotton-growing would be a sheer impossibility. How this is done is not made clear, but the fact remains. The increase has natural bounds set to it, but, as these are insufficient, man must come to Nature's assistance by the employment of "sprays" such as Paris Green, London Purple, or some other arsenical preparation. The trouble is, that the *underside* of the leaves must be sprayed, and to get at this dry-spraying is preferable to the wet method. A spray applied in the form of dust will reach all parts of the plant, but it must be applied when the leaves are wet with dew or rain. The ravages of this caterpillar have cost the American Government and planters millions of pounds sterling in damage to crop and in expense of attempts at extirpating them.

The next bad pest is the boll worm (*Heliothis armigera*), of the Noctuidae family. This destructive pest was not unknown in Queensland when cotton was largely grown. The first half of the life of the caterpillar is spent, like the former, on the underside of the leaves, the bolls being attacked later on. It might be hoped that, as such a length of time has elapsed since cotton was planted in the southern part of the State, the boll worm would have died out, but, unfortunately, it attacks maize, tomatoes, beans, melons, &c., and may therefore again appear in the prospective cotton fields. It is an enemy of the cotton worm, and devours the chrysalides of the latter. Still it is a far more dreaded pest than the cotton worm, for, whilst the latter only devours the leaves of the plant, which in itself is bad enough, although the crop is scarcely damaged by him, the latter seizes on the bolls, and the smaller unripened bolls on being attacked fall off, whilst the larger ones, though they remain on the tree, are quite destroyed. The best remedy against this ruthless destroyer is constant cultivation of the ground and the destruction by fire of the bushes on which the bolls were attacked.

Of fungoid diseases to which the cotton bush is subject the worst is rust. The rust will often destroy all the leaves of every bush in a field, but sometimes only a portion of a field is affected. The most effective remedy against this

disease is a sulphur spray, but generally the remedies used in orchards and vineyards against fungus disease will be found fairly efficient. I shall deal with these pests and diseases at greater length later on.

I have no wish to deter anyone from growing cotton by the enumeration of the above three pests or scourges, as the two former at least may be called. If the knowledge we possess of the hundreds of enemies—rodents, insects, fungi, &c.—which play havoc with our orchards, vineyards, farms, and gardens were to so alarm men that none would venture to sow or plant, the world must come to a standstill, the arts of peace, as well as the horrors of war, oversea and overland travel—all would come to an end. There would be no kings or queens, and no nations for them to bless or otherwise with their rule. All are served by the field, and where, as I have shown, there are so many millions of people who are clothed in cotton fabrics, cotton must and will be produced to supply the demand, and I do not hesitate to say, after visiting many lands, that there is no country in the world which has better soils, better climates than, or so many hundreds of thousands of acres suited to the production of both Sea Island and Uplands cotton as this State of Queensland.

We may be experimenting with varieties of cotton in order to find out which will suit the requirements of our varied soils and climates of North, South, East, and West, but we are most certainly not experimenting to find out whether cotton will grow or whether it can be grown commercially in Queensland. That question has long ago been settled in the affirmative. Now, there is a cry for cotton from all the manufacturing centres of Europe, and the European countries which possess colonies in tropical regions are straining every nerve to take advantage of what may be called the "Boom in the Cotton-growing Industry." Why should Queensland not share in the rapidly approaching prosperity which next year will add millions to revenue of those States which are wise enough to seize the opportunity?

A CATECHISM OF COTTON.

1. In what districts of Queensland may Uplands and Sea Island cotton be profitably grown? Sea Island cotton can only be grown profitably on the Northern coast lands. Uplands cotton will succeed to perfection in the Southern river districts, such as Nerang, Coomera, Pimpama, Logan, Albert, and all along the coast of Queensland to the extreme north; inland, Uplands may also be grown between the coast and Thargomindah, and in the Central districts between Rockhampton and Longreach.

2. Does cotton require a regular rainfall during the growing season? Experiments and general practice have proved that moisture is best supplied to the cotton plant by deep cultivation of a fairly porous soil or well-drained soil. Stagnant water is fatal to it. On soils which easily absorb heavy dews, the rainfall need be but very slight, but means of irrigation should always be ready, because, although the cotton plant will thrive under dry-weather conditions which would destroy a crop of maize or potatoes, still a certain amount of regular moisture is needed, especially below the ground, for the proper development of plant and pod.

3. What is the best kind of soil for cotton-growing? Preferably a good sandy loam, not too rich in humus (or decayed vegetable matter). But there are black and brown soils in the Logan and Albert and West Moreton districts which are admirably adapted to cotton-growing, especially those which overlie a limestone formation. Very rich heavy black and clay soils should be avoided, as on these the plant will run to wood, and produce so little cotton as to make the crop unprofitable.

4. At what distances apart should cotton be planted? This depends, to some extent, on the nature of the soil. In fairly rich cotton lands the rows should be 4 feet apart and the bushes about 2 feet apart in the rows for Uplands, and from 5 to 6 feet and 4 to 5 feet respectively for Sea Island varieties. In poorer soils, closer planting may be resorted to.

5. How much seed is required for an acre of cotton? This question must be answered with a reservation. If only one acre be planted, it will be done by hand probably. In that case, 1 lb. of seed would be sufficient. But for larger areas, say from 5 to 10 acres, sown by a seed drill, double that quantity, and even more, would be required. Whether sown by hand or drill, about six seeds should be dropped at the intervals before stated.

6. When those six seeds are up, what is next to be done? Wait until they are about 6 inches high; then pull out all but three plants. When these three are from 1 foot to 18 inches high, pull out two, leaving one plant for the crop.

7. Can those uprooted plants be planted out like cabbages? Yes; and they will bear as well as those left standing.

8. What after cultivation does cotton require? The same as that required by maize, mangels, or any other crop on which machines can be used until the leaves or branches spreading out prevent the passage of horses. The cotton crop must be kept thoroughly clean and the soil in good tilth. Constant cultivation destroys pests, and enables the soil to absorb moisture, which the plants again absorb through the roots.

9. When does the crop begin to come in? About March, and continues for three months at least.

10. How is it known when cotton is ready for picking? The bolls turn brown, and burst open. In a day or two afterwards the boll husk will have opened widely, and the soft dry cotton will hang out, adhering so loosely to the pod that a slight pull extracts the whole of it.

11. Does it matter at what hour of the morning picking begins? Yes. Picking should not begin till the dew has quite evaporated from the plants.

12. How much cotton can a man, boy, or girl pick in a day? A man can pick 100 lb. a day. As the season advances, and the ripe bolls are more numerous, he can pick from 150 lb. to even 200 lb., if experienced at the work. Boys and girls pick at the commencement of the season from 50 lb. to 60 lb., advancing to as much as 80 lb. and 100 lb. as they get used to the work.

13. What is the usual price paid for picking cotton? One halfpenny per lb. on small lots, and 6d. for 13 lb. on larger plots.

14. Can cotton be grown and harvested by white labour only? Yes. Black labour is not required. Even in the tropical North, where white men can make good wages at cane-cutting, they could do better at the easy work of cotton-picking.

15. What is the produce of an acre of cotton? If the land has been properly cultivated, if the soil is suitable, and the variety sown is good, the return should be, at the very least, 1,000 lb. of cotton in the seed; 1,200 lb. to 1,500 lb. of seed cotton have been produced per acre under favourable circumstances. Sea Island cotton of the Caravonica variety grown in Cairns is said to produce as much as 1,000 lb. of clean lint per acre, but this is open to doubt.

16. What is the proportion of clean lint to seed? 1,000 lb. of Egyptian, or of the best American kinds, will give 600 lb. of seed and 400 lb. of clean lint; but it is better to reckon on no greater yield than 300 lb. of lint.

17. What is the present value and what the average value of clean cotton in the home markets? The present price ranges from 5d. for inferior varieties to 7½d. for the better kinds of Uplands, and from 1s. to 1s. 9d. per lb. for Sea Island. The average price must depend on the future relations of supply and demand. Owing to the supply not equalling the demand at present, the average price may be set down at from 5d. to 6d. per lb.

18. In the event of a farmer growing a small patch—say, of 5 acres—of cotton, at what price could he sell the seed cotton? The price which merchants will give for seed cotton will probably be 2d. per lb. Should the present rise in home prices continue, or should a bonus be granted on cotton the produce of Australia, a higher price might possibly be given.

19. How will 2d. per lb. for cotton show against, say, a 40-bushel crop of maize at 2s. 6d., or a 40-bushel crop of wheat at 3s.? A farmer with a very slight knowledge of arithmetic can answer that question better than any one else. Forty bushels of maize bring in £5 per acre gross return; 40 bushels of wheat bring in £6 per acre gross; 1,000 lb. of cotton bring in £8 6s. 8d. per acre gross. The expense of a cotton crop from seed to harvest is far less than the expense of either cereal crop. Maize and wheat require to be threshed after pulling and husking or reaping and binding. Cotton demands no outlay beyond the cost of picking, whilst cartage and bags are incident to all three crops, but the cotton-grower does not sell his bags with his cotton.

20. Would it pay a farmer better to gin his cotton than to sell it in the seed? No. The grower of even 100 acres cannot gin his cotton as cheaply as those who make cotton buying and ginning a business.

21. Would not the seed make a difference in the price paid for cotton? It certainly should do so. Formerly the seed was thrown away as valueless, except as manure. Now it has a value of about 25s. per acre. The buyer takes the seed as well as the cotton, and should therefore allow the grower to participate in the profit derived from the sale or manufacture of the by-products of the seed.

22. When the cotton is picked, how is it prepared for sale? Every day's picking should be exposed for a few hours to the sun, to extract any moisture which may be in it. This exposure has also the effect of extracting some of the oil from the seed, thus giving a certain lustre and silkiness to the cotton fibre, and rendering it easier to gin.

23. When the crop is off, what is done with the bushes? If a farmer has dairy cattle, he may turn them into the field, where they will find a good deal of nutritive fodder in the leaves and twigs of the plants. Then the plant may be treated as an annual and ploughed out, or it may be pruned to within 1 foot or so of the ground, when it will make an early start in the spring.

24. Which is the better plan? Where frost is to be feared, it is better to treat it as an annual; but where no frost occurs, by pruning the plants the crop will be a month or six weeks earlier. Where the cotton and boll worm are troublesome, it is better to root up and burn the plants.

25. Is cotton an exhausting crop? To a certain extent, but not more so than many other crops which are repeatedly grown on the same ground. If the seed, or even the seed hulls, are returned to the soil, the latter will practically never become exhausted.

26. Whence can good reliable seed be obtained? If intending growers notify their requirements to the Department of Agriculture in time, and are willing to pay a reasonable price for the seed, the Department would no doubt try to meet their views by importing seed.

[Since the above was written, the Department has ordered a quantity of seed of the most suitable varieties from America, which will arrive in time for early planting. Its arrival and price will be duly notified in the *Journal*.—Ed. Q.A.J.]

THE COTTON MARKET.—PROSPECTS OF THE QUEENSLAND FARMER.

Many people profess surprise at the sudden dearth and consequently high price of cotton, and they prophesy a speedy fall in prices. A full study of the position, as detailed in all American and European journals devoted to the cotton interest, reveals the fact that the cotton supply of the world is not temporarily but permanently affected. Hence the feverish anxiety of the British and foreign cotton-spinners to expedite the growing of cotton in their respective colonies. Shrewd business men, they can see far enough ahead to be

satisfied that, unless a permanent supply of the raw material can be guaranteed from our own possessions, cotton famines will be the rule and not the exception. They would not be likely to send men all over the British colonies, as does the British Cotton-growers' Association, nor to raise half a million of money to assist in establishing an industry, if the sudden emergency were a mere flash in the pan. If British merchants expend £500,000 in any business, they do so after carefully considering the position and the probable return of their capital with good interest. The high price of cotton must affect the price of wool. We showed in a previous article how many millions of people wear more or less cotton clothing. Many of them wear both woollen and cotton, but if they have to pay a high price for the latter it follows that they will expend less on the former.

Cotton is largely mixed with other textiles in the manufacture of fabrics, and if it becomes increasingly costly, or even remains at the present price of 8d. per lb., wool must take its place to a very large extent in the manufacture of many mixed fabrics. Of course, it is too early to predict anything with certainty in this direction, but should our supposition be correct then the price of wool will be increased.

Those who do not look below the surface can have no conception of the part played by cotton in the economy of the world. A cotton famine means the impoverishing of the cotton-manufacturing districts, which are great wool consumers, and it tends to raise the price of the necessities of life not only in the cotton districts but all over the world. A plentiful supply of cotton is therefore an imperative necessity.

Egypt is looked upon as the future cotton field of the world. That country has abundance of cheap labour, it is close to the home market, and the Egyptian Government, like that of India, is only too willing to supplement the capital invested in the industry by granting facilities to those desirous of entering upon cotton cultivation.

It must, however, be remembered that at present Egypt has about reached the limit of its production, a production which cannot be very sensibly increased until the completion of the new irrigation works, which will bring hundreds of square miles of the Soudan within the cultivation area.

The South African colonies, which also possess cheap labour, are handicapped by distance from port and difficulties of transport. India produces large quantities of cotton, but it is of an inferior kind, and brings a low price in the home market. The West Indian colonies have greater advantages. They produce an excellent cotton, they have fairly cheap labour, comparatively easy means of transport to port, and are situated at no great distance from Liverpool, Manchester, and London.

There remains Australia, and here a large portion of the States lies outside the cotton belt. But the whole of the Northern portion of Australia, from the 36th parallel of south latitude, is well adapted for cotton cultivation. The cotton belt of Queensland alone covers an area of 150,000 square miles, without going further west than Charleville or Georgetown.

Cotton-growing in Queensland, however, must be carried on by different methods than those which can be adopted in countries teeming with cheap coloured labour like Egypt and India.

The "white Australia" idea puts the Northern Territory of South Australia and the north of Western Australia out of consideration, although their Northern lands have been proved to be ideal cotton country. The same may probably be said of the extreme north of Queensland, from Townsville northwards. But even here, since it is stoutly maintained that white men can do all the work of the Northern canefields, if that be so, then the light labour demanded by the cotton industry can be much more easily carried out by them.

Meanwhile we look to the Southern and Central districts more than to the North for our future cotton supply. There are some who say that cotton cannot be grown without cheap black labour. Why they cling to this erroneous idea is not quite clear. It appears to be advanced mainly by persons who have

only read about cotton-growing in what were once the slave States of America. They cannot have any knowledge of the past history of cotton-growing in Queensland. When cotton was first grown in this State, we believe—we cannot say authoritatively—that some 600 bales were produced by the aid of kanaka labour. This was prior to 1861, when three companies were formed for the purpose of carrying on the industry on a large scale, on the plantation system. These plantations were formed at Caboolture, Ipswich, and Maryborough. In 1862 two additional companies were formed—viz., the Manchester Cotton Company at Nerang Creek, and the Victoria Company on Hotham Creek.

After that, cotton-growing was generally taken up by the farmers, and here we wish to point out that large cotton plantations never have been and never will be successful in Queensland. All cotton to be produced to pay the grower must be grown in small areas by farmers who will only employ white labour in the business. Then the question arises: Will it pay to grow cotton by the help of white labour? The reply to this lies in the reply to a further question: Has it paid to produce cotton by the help of white labour in Queensland?

Those who are acquainted with the history of the cotton industry in this State will unhesitatingly affirm that it has paid, and paid handsomely. Only lately a farmer who attended a meeting convened at Rosewood to hear what Mr. Bottomley, the representative of the British Cotton-growers' Association, had to say on the commercial aspect of the business, stated that he had picked £21 worth of cotton from 1½ acres. This was done without black labour. The cotton-growers of the past were small farmers who cultivated from 1 to 20 and even 50 acres of cotton, and it was all picked by white men, boys, and girls. The price paid for picking was ½d. per lb., and from 50 to 150 lb. of seed cotton was considered a fair day's work. Many farmers hired no labour, but kept the picking in their own families. What this meant to the family income may be gauged by calculating that 1 acre will produce 1,000 lb. of seed cotton. One family can easily harvest the crop from 5 acres—that is to say, that 5,000 half-pence were saved to the farmer. Instead of paying over £10 to house his crop, he kept it in the family.

It has been attempted to draw a weird picture of the unfortunate women and children wading to their middle in wet weeds, picking cotton under the blazing sun of the hottest season of the year, carrying a bag weighing 50 lb. round their necks from 8 a.m. till dark.

What are the facts? A good farmer keeps his crops clean, therefore the picker has no weeds to contend with. Picking never begins until the dews of night are completely evaporated, by about 9 or 10 o'clock a.m. The picker carries a bag which may hold 10 lb. weight of cotton, which is emptied at the head of the row into a sack, so that the weight carried by the boy or girl picker need never exceed 10 lb. The picking season here begins in March and extends to June, all those four months being in the cool autumn season. Compared with picking up potatoes, pulling and husking corn, planting out cabbages, &c., cotton-picking is the lightest of employments on the farm and the best paid. Every boy or girl employed at the work can, without distress, earn from 2s. 6d. to 6s. 6d. per day. There is no compulsion, no slave-driving. The young people work intermittently as it pleases them. To-day they will clear off the ripe bolls from every bush. To-morrow they will only gather the latest ripened bolls. In this the work differs materially from cane-cutting, which demands able-bodied men, able to keep constantly at it from early morning until "knock-off" time, day after day, without intermission. To take a domestic view of the work. A boy wants a couple of shillings to buy something he has set his heart on. All he has to do is to go into a cotton-field, pick for a day or two, and earn the money. These young people of the farms are not of the namby-pamby order of town-bred youth. Their hands and faces are tanned and ruddy with health. They do not require to skulk about in the shade, but spend their active lives in the free, open air, and make little of sun or rain. But, some say, what about their schooling? Cotton-picking never interfered with

their school work. Either they attended school for half-time during the season, or the holidays were so arranged as to fall in with the picking season. Just one instance we will give of a farmer's family in the neighbourhood of Brisbane in those early cotton days. The farmer had four sons and three daughters. They were brought up to all kinds of farm work, to sugar and cotton growing. Nothing came amiss to these young people. They helped to burn off scrub, to feed pigs and horses, to bundle up lucerne, pick up potatoes, trash cane, and pick cotton. What chance, a pessimist would say, had these poor children of rising in life? Well, one is a school inspector, another managed a large sugar plantation in Fiji and now manages one of the largest sugar plantations in the North, a third is conducting a highly profitable private business, whilst the girls are married and in good positions. How did they get their education? Simply because their parents never allowed them to neglect it. The education was steadily kept in view all through the farm life. Many instances can be quoted of similar success achieved by young people who have gone through every phase of farm life.

To sum up, we believe, from all the indications, that once the farmers take up cotton-growing the industry will have come to stay. As we have said, the cotton market is permanently affected as to supplies. In the United States the multiplication of cotton-mills is resulting in the absorption of many thousands of bales of cotton which formerly were sent to England. The boll worm and leaf worm are also responsible for a great shortage in the annual crop. It therefore appears tolerably certain that those countries which promptly take the golden opportunity to supply the deficiency will have no cause to regret their action, nor do we think that there is any doubt but that a payable price will be obtained at least for several seasons to come. The Queensland Government is affording every facility to Mr. Bottomley to thoroughly acquaint himself with the prospects for the industry in Queensland, and has made arrangements for a supply of seed for the ensuing season. We understand that Mr. Bottomley has cabled to the Cotton-growers' Association for definite information as to the minimum price which will be paid for Queensland cotton. Meanwhile we would suggest to those who are inclined to plant in September or October to set aside a certain portion of their land, and have it ready for sowing. With cotton at from 6d. to 8d. per lb. they cannot well go wrong.

COTTON NOTES.

THE COTTON BOLL WORM IN THE UNITED STATES.—The Mexican cotton boll weevil is steadily spreading in the United States. It has, however, not yet reached the eastern cotton-growing States. It is probable that Congress will be recommended to appropriate a sum of 5,000,000 dollars (£1,000,000) to be expended by a commission under the direction of the Secretary of Agriculture in combating this pest.

COTTON-MILLS IN INDIA.—The increasing tendency towards the manufacture of cotton in the countries that produce the raw material is illustrated by the growth in the number and output of the Indian mills. In 1882-83 there were 62 mills, with 1,654,000 spindles and 15,000 looms; in 1902-03 there were 201 mills, with 5,164,000 spindles and nearly 44,000 looms, so that the industry has increased almost threefold in the last 20 years. Of the existing mills 113 are exclusively for spinning, 4 exclusively for weaving, and 84 for both spinning and weaving. Owing to unsatisfactory trade, 12 mills were closed during the year. The total capital invested in the mills is estimated at £12,000,000; and the number of operatives at a daily average of 178,500.

A NEW COTTON COMPANY.—A company has been formed, with a capital of £250,000, to grow cotton in the British portions of Africa and in the West Indies.

It is to be hoped that when Mr. Bottomley has opened the eyes of British capitalists to the suitability of the soil and climate of a large portion of

Queensland for cotton-growing, they may turn the golden stream in this direction. Given a fair start and a fair price, Queensland can grow the best cotton in any quantity.

EGYPTIAN COTTON SEED.—The large amount of money made in Egyptian cotton last season caused a great deal of speculation in Alexandria in seed, rendering business here most difficult. Had it not been for the unprecedentedly heavy exports of Indian seed, values of Egyptian would, no doubt, have been forced up considerably higher than they were, but with Indian seed being shipped to the extent of about 225,000 tons the Egyptians were forced to modify, to a certain extent, their extreme views. Large stocks were reported to be held in Alexandria until late in the year; in July it was generally anticipated that about 30,000 tons would be carried over into the new season; prices then went as low as £5 10s. for spot seed in London, and manufacturers were anticipating operating in new season's shipments at somewhere near this figure. Towards the middle of August, however, the whole position became suddenly changed. The association in Alexandria discovered that they had made a mistake in their estimates of stocks of about 10,000 tons; it also became apparent that the local consumption had been very much under-estimated, so that, instead of about 30,000 tons being available at the close of the season, there were not more than 5,000 tons. Values immediately improved from £5 15s. in the beginning of August to £6 15s. During September the quotation dropped to £6 5s.—when the first arrivals of new seed came to hand. During early October, there being a large parcel of arrived seeds pressing on this market, prices declined to £5 17s. 6d. As soon as this was disposed of, values quickly recovered to £6 5s. The year closes at £6 3s. 9d., nominally, for spot Egyptian cotton seed in London.

The trade for cotton cakes has been good throughout the year, with an increased consumptive demand.—*Mark Lane Express*.

COTTON-GROWING IN EGYPT.—The Egyptian cotton crop this season is expected to be a very large one, and it is estimated that it will be about 6,500,000 cantars, 1 cantar equalling about 99 lb., but the quality has been greatly damaged by fogs and rain. There has been a noticeable falling off during the last few years in the quality of Mount Affifa cotton, but some of the cultivators are giving great attention to the improvement of the cotton and to a more careful selection of sowing seed. The total exports of cotton seed for the year ending 31st December, 1901, were 393,804 tons, as against 378,702 in 1900 and 379,285 tons in 1899. Seed-crushing in Egypt continues active, and a new mill of thirty-two presses has, according to the annual report of the British Chamber of Commerce of Egypt, been erected at Kafr Zayat.—*Zanzibar Gazette*.

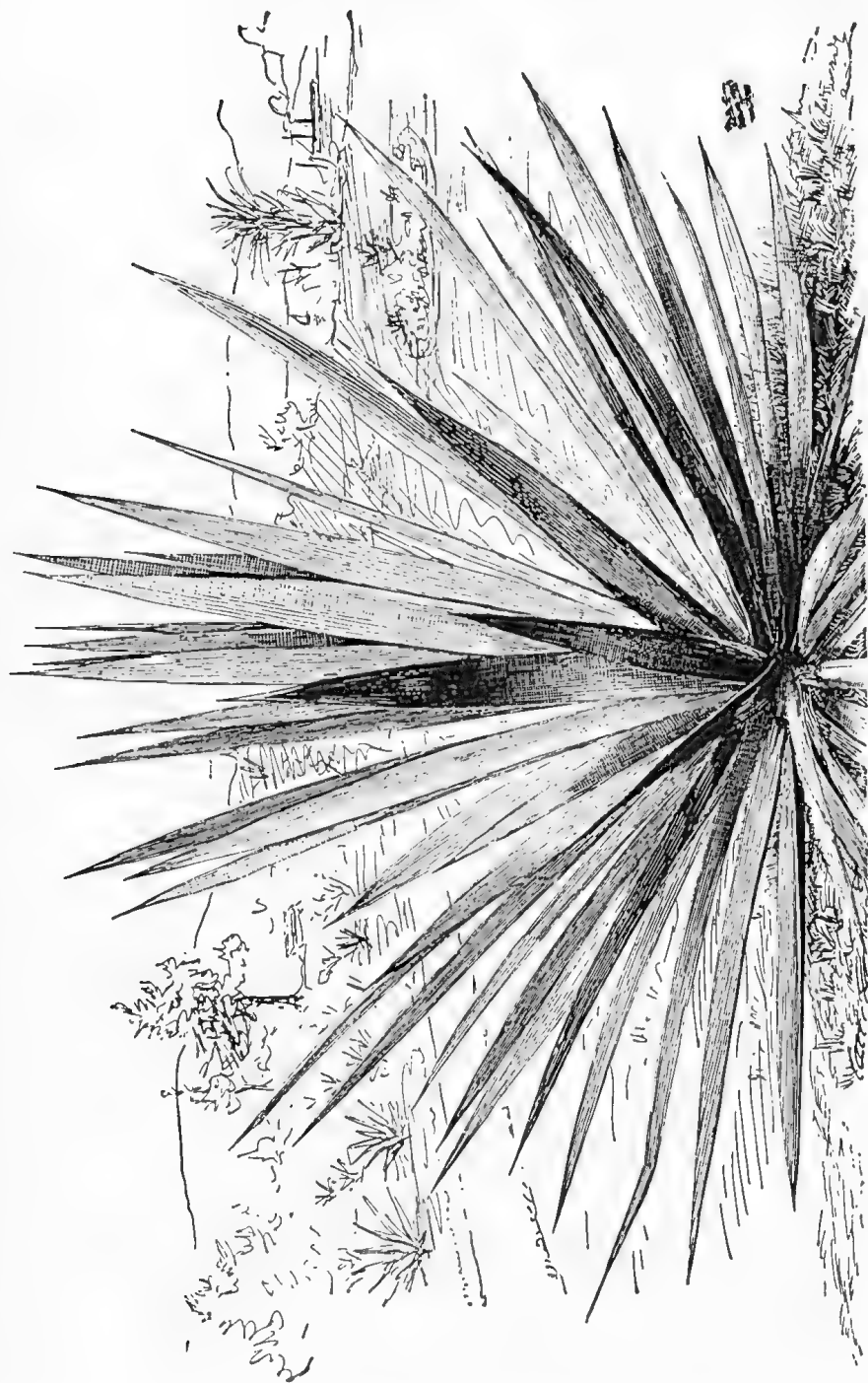
[Reducing cantars to English pounds, the crop will amount to 643,500,000 lb. If this means clean lint, then the crop of seed cotton, on the basis of 1,000 lb. per acre (a very low estimate for Egypt), and allowing 50 per cent. for seed, will amount to 1,287,000,000 lb., the produce of 1,287,000 acres. The remark concerning the falling off in the quality of the Mitaffi or Mount Affifa cotton is worthy of note, as this particular variety of cotton has been experimented on by the Queensland Acclimatisation Society, and appears to have done remarkably well. Samples sent to England for report have been valued at 7½d. per lb.—Ed. *Q.A.J.*]

SISAL HEMP.

The sisal hemp of commerce is a product of one of the Agave family, belonging to the natural order Amaryllidæ. There are several species, and all were originally natives of Central America, and chiefly of Mexico, whence the name sisal grass of Mexico. They are now, however, widely acclimatised in most warm, temperate, or sub-tropical and tropical countries. They take several years to reach the flowering stage, and from the fact that in adverse



Plate XVIII.



Foureroya gigantea.

circumstances their development may be retarded from 10 to 50, even to 100 years, they are popularly called the "Century Plants."

VARIETIES.

There are, as stated, several varieties of the sisal hemp plant (*Agave rigida*), but the three chief ones from which the sisal hemp of commerce is extracted are:—

- (1) *Agave rigida*, var. *elongata*, of a greyish-green colour, with thorny spines on the edges of the leaves.
- (2) *Agave rigida*, var. *sisalana*, of a dark-green colour, having no spines on the edges of the leaves, the absence of which facilitates handling.
- (3) *Agave Heteracantha*, known as "Ixtl" in Mexico, is largely used in the manufacture of nail and scrubbing brushes, for which purpose a very great demand exists for the fibre. It is also used in the manufacture of corsets and of artificial flowers.

In the Mauritius, the plant furnishing what is known commercially as Mauritius hemp is the *Fourcroya gigantea*, or, popularly, the Green Aloe. This plant is, erroneously, supposed to be an Agave. It belongs, however, to the same natural order as the Agave—viz., Amaryllidæ.

This *Fourcroya* is found in all parts of the coast lands of Queensland, and wherever it has been introduced it has thriven as well as in its native Yucatan. Although not as valuable a fibre plant as the *Agave sisalana*, it is nevertheless of considerable commercial value, and in districts where the plant is acclimatised it seems folly not to utilise it. The plant grows like a weed. It is almost as hard to kill as the prickly pear, and it produces a mass of fibre which can be sold in any quantities in the home markets for £30 per ton.

Of the seven varieties of the Agave plant cultivated in Yucatan, the best is that known as "Sacqui"—meaning white in the Indian dialect, owing to the light-green colour of its leaves. This variety possesses all the best attributes of a fibre plant—viz., abundance, flexibility, whiteness, strength, length, and weight. The leaves of all the varieties vary in size, from 5 to 7½ feet in length by from 4 to 7 inches in width. The plant has many names in Yucatan, such as "Henequin" in Spanish and "Sacqui" in Indian. Doctor Perrino, who introduced it into Florida, gave it the name of *Agave sisalana*. In Cuba it is known as the "maguey."

SOIL.

There is no known plant which will thrive so well and yield such large returns on poor, impoverished-looking, dry, rocky soils as the sisal hemp plant. Except on absolutely barren sands, it will thrive in any kind of soil, the sole condition being that the latter be dry or thoroughly well drained. It is waste of labour to plant it on wet soils. On rich agricultural land it will thrive most luxuriantly, but the fibre will be inferior to and less in quantity than that from plants grown on poorer, arid land. There are hundreds of acres in the neighbourhood of Brisbane alone which would yield rich returns if planted with sisal hemp instead of being overrun with wattles and lantana. The writer a couple of years ago tried, in conjunction with a prominent resident of Coorparoo, South Brisbane, to introduce the cultivation of the plant into that district, but was met with the usual incredulity and apathy. No one could be induced to believe that those wretched gravelly soils would grow anything but stunted gum-trees and wattles. The result is that, where owners of such property could now have been getting good returns from their unused lands, they are paying more than they are otherwise worth in rates and taxes.

PREPARATION OF THE LAND.

The land requires no preparation whatever prior to planting. No ploughing or harrowing is needed. The land should be laid out in blocks, with roads between for the passage of drays when harvesting. Holes are dug in rows 11 feet apart, and from 6 to 7 feet apart in the rows. This will give 650 plants to the acre.

PLANTING.

The Agave may be propagated from seed or from suckers. Suckers should be preferred, as the returns are obtained a year or two earlier than when the plants are raised from seed. In removing young plants from the nursery, and before planting them out, the roots must be cut off right up to the stem, and any dry leaves pulled off, exactly in the same manner as pineapple suckers are treated for planting out. The young plants must be planted perfectly upright, for if put in slantwise they grow out across the rows, and there is no getting between them to gather the leaves which ripen first.

CULTIVATION.

Once the plants are put in they may be practically left to themselves. Should weeds be troublesome in the early stages of growth, these may be hoed down, but soon the plants require no attention. The simplicity of the cultivation may be conceived from the statement by a writer who had been in the business in Central America, that there is not a hoe or spade, harrow or plough, employed in its cultivation in all Yucatan. When the plants are from three to four years old, any stock, even goats, may be turned in to keep the weeds down. They will have nothing to say to the Agave with its pointed spear. Whilst the plants are still young, however, they should be protected from stock, not from any fear that they will be eaten, but to prevent their being knocked out or trampled down.

HARVESTING.

The Agave will yield full returns in four or five years, but harvesting may be begun in three years after planting. The ripened lower leaves are cut off, and every four months the same operation may be repeated. When the leaves are ready for cutting they incline downwards to a horizontal position, and become darker in colour. Care must be taken to cut the leaves from the bottom upwards, and to cut close to the stem. If the *Agave rigida*, the variety having spines on the edge of the leaf, is being harvested, the spines must be trimmed off each leaf to facilitate handling. The leaves are usually tied in bundles of 25 or 50, point to butt alternately, and carried to the headland, when the drays take them up. One man can cut and tie up 1,200 leaves per day on an average. The knife used for cutting is an ordinary sheath knife with an 8-inch blade.

LIFE AND YIELD.

The life of the Agave plant is a comparatively long one, but this long life may be shortened by careless or injudicious management. If the plant is allowed to send up a pole, it is ruined for fibre production. The pole on which the flowers and seeds are borne will run up to a height of 30 or 40 feet. Regular cutting of the leaves retards the production of the flower pole, and will prolong the life of the plant to fifteen years and more. About every two years numerous shoots spring from the roots, and these may be either used to form fresh plantations or may be destroyed. When the Agave has completed its fifteenth year, it may be cut down, but one of its root shoots must be left to take its place. Thus, the original area planted will never require to be replanted, whilst large numbers of young plants are produced to form new plantations.

Now as to the yield. I will place before the reader the statement of Mr. Quennel, published in the *Journal of the Jamaica Agricultural Society* about four years ago. Mr. Quennel says:—I take for planting 5 rows in 36 feet—that is to say, 4 at 6-feet distance, and 1 at 12. I put the plants 6 feet apart in the rows. This gives me more than 1,000 plants to the acre. (It will be observed that Mr. Quennel allows for much closer planting than I have allowed for.) Each plant, at four years, gives forty leaves a year of a weight of 50 lb., of which 4 per cent. turns into fibre, dried and white, or 2 lb. of fibre to a plant, or 2,000 lb. to an acre. The fibre plant gives a hemp of a value of £30 a ton in London, which Mr. Quennel reduces to £14 a ton, after allowing for all possible expenses, including cultivation and packing. £14 a ton is more than 3 cents (1½d.) per lb. He allows only 2½ cents (1¼d.) per lb. to make

50 dollars (£10) an acre. Thus, an acre producing a net profit of £10 yields double the results of 200 cacao-trees on an acre, at 10 bags per 1,000 trees at 12 dollars (£2 8s. 4d.) net, when the London price is 65s. It is a great deal more than 20 tons of sugar-cane to an acre at 9s. per ton (from which all expenses have to be deducted).

I will take another authority quoted by Mr. P. McLean, Agricultural Adviser, in his article on sisal hemp in this *Journal*. He says:—Each robust plant is capable of yielding from 25 up to 100 leaves per annum. Hence, 1 acre containing 600 plants will produce from 15,000 to 60,000 leaves per annum. The average yield of dry fibre from 100 leaves is 4 lb.; therefore, 1 acre will yield from 600 lb. to 1 ton of fibre. Frequently $1\frac{1}{2}$ tons per acre have been realised, and with the latest improved machinery from 2 tons to $2\frac{1}{2}$ tons per acre may be realised. The working expenses have been usually averaged at about 30 per cent. of the value of the fibre produced per acre. Therefore, taking an average yield of 1 ton of fibre at, say, £40, and from this deducting 50 per cent. for working expenses, it will be seen that the net profit is £20 per acre. (The value of sisal hemp at present in the London market is £32 per ton.) In a pamphlet on sisal hemp, Mr. D. J. Stoddart says: "Many farmers' annual incomes are from £100 to £400 from sisal hemp," planted in out-of-the-way places on the farms.

The usual price of sisal hemp is £40 per ton, and the price is regulated by that of Manila hemp, which has lately been very high. In 1902 some sisal fibre, grown at St. Helena Penal Establishment, was sent to Melbourne, and was reported on by Messrs. James Miller and Co., rope and twine manufacturers. The report stated that it was "of very superior quality, and worth about £35 per ton."* Now, if we put the value of hemp grown in Queensland at £35 per ton, and deduct as much as 50 per cent. for working expenses, there still remains a profit to the grower of from £17 10s. to £26 5s. per acre.

EXTRACTION OF THE FIBRE.

Notwithstanding the constant advocacy of the industry, both by official and private agricultural and other journals, farmers have hesitated to plant owing to the fear that expensive machinery is required. This is quite a mistake. There are expensive machines, costing, with boiler and steam-engine, up to £1,200, turning out three-quarters of a ton of fibre per day. But there are other machines, called "Raspadors," universally used in all countries where agave hemp is grown, and which are kept on large estates even, in the event of any breakdown of the big machinery. A raspador can be bought as low as £30, and such a machine will turn out 333 lb. of clean dry fibre in ten hours. Raspadors have been greatly improved upon. In Yucatan and Mexico, Death and Ellwood's machine and the "Kennedy" are much in use, the former being as nearly perfect as possible. One of these is sufficient to work off 100 acres of leaves annually. In Mauritius, a machine called the "Gratte" is used. Both the names of the machines signify "raspers" or "scratchers." The "Raspador" consists of a large-toothed wheel which scrapes the pulp away and leaves the fibre. The following table will show the kinds of machines in actual use in Yucatan:—

Machine.	Number of Leaves cleaned in 10 hours.	Actual Horse-power.	Number of Men needed.	Cost of Machine.		English Money in round numbers.	Number in use.
				Mexican.	United States.		
				†Dollars.	Dollars.	£	
Lanaux ...	130,000	35	3	6,000	2,856	571	6
Prieto ...	125,000	60	3	7,000	3,332	664	90
Stephens ...	150,000	70	3	11,000	5,236	1,047	6
Solis (Raspador)	9,000	6	2	250	119	24	1,200
Torroella	80,000	30	3	5,000	2,380	476	20
Villamor ...	70,000	35	3	6,000	2,856	571	?

* A sample of Sisal Hemp prepared at St. Helena was sent in February last to Melbourne to be reported upon by experts in fibres for rope-making.—Ed. Q.A.J.

† Average value of the Mexican dollar, about 1s. 11½d.

The cost of production is a little less than 1d. per lb. For convenience I will take the Mexican dollar at 2s., which would bring the cost of the Raspador to £25.

The Death and Ellwood machine, to deal with 100 acres, costs about £24. The "Marabal" and the "Kennedy" are similar machines. All can be driven by steam or water power, and the cost of production of clean fibre may be set down at a little less than 1d. per lb. in Mexico.

CASTOR OIL PLANT.

The castor oil plant (*Ricinus communis*) is a native of all warm countries. It is very hardy, and will thrive on almost any soil and in any situation, attaining a great height in one season after sowing the seed. In Queensland it grows to a large size, and is looked upon as a weed, instead of as a plant from which a paying industry could be established. The plant likes dry soils, to which it imparts great fertility instead of exhausting it. The seeds should be sown in rows 6 feet apart, and 4 feet in the rows. Before sowing, the seeds should be steeped in hot water for twenty-four hours. After the plants are above ground, the cultivation is the same as for corn or cotton or tobacco. When the seed pods are ripe, they suddenly burst open and scatter the seeds in all directions. Special arrangements must, therefore, be made for harvesting them. When the pods are seen to be turning brown, the spikes which bear them are cut off and taken to a clean-swept piece of hard ground which may be enclosed with galvanised iron. Here they remain, being turned occasionally until the pods have emptied themselves. The husks are then removed by winnowing, and the beans swept up and bagged. They must on no account be allowed to get wet. This work is so light that it can be done by young children.

The yield of beans varies between 20 and 30 bushels per acre.

EXTRACTION OF THE OIL.

This is done by means of a hydraulic, a screw, or a lever press. What is known as "cold-drawn castor oil" is that obtained by mere pressure. The first thing to do is to remove the external hull. This is effected by passing the beans through two revolving rollers, set in such a way as merely to crack the hull, which is then got rid of by winnowing. The decorticated seeds are then put into coarse hempen bags—usually esparto grass bags about 2 feet in diameter. Between each layer of bags there is placed a steel plate, and about 20 or 30 bags, each holding about 40 lb. of seeds, are placed on top of each other in the press. The pressure must be applied gradually, and the oil running from the first press is the best. As the pressure is increased up to the full power of the press, a second quality is produced. The pulp after this is taken out, mixed with hot water, and again pressed to obtain the third quality. The oil from the mill runs from it into a receptacle below. Another method is to place the beans in a stone roller-mill, identical with the grinding mills of ancient times. This consists of two large round stones connected by a spindle, which are revolved by horse-power in a hollow round stone, in which the beans are placed. These stone mills hold about 2 cwt., and this quantity is crushed every half-hour. I saw one of these mills working in Egypt, and another in Ceylon, and they are very effective. The oil is poured into filtering bags, and the pure oil runs from the shelves on which the bags are placed through tubes into vessels placed to receive it. The yield of oil varies from 40 to 60 per cent., but the average yield is usually 40 per cent.

The oil cake makes excellent manure. The usual price of castor oil for lubricating purposes—not medicinal—is from 2s. 9d. to 3s. per gallon. From



CASTOR OIL PLANT.

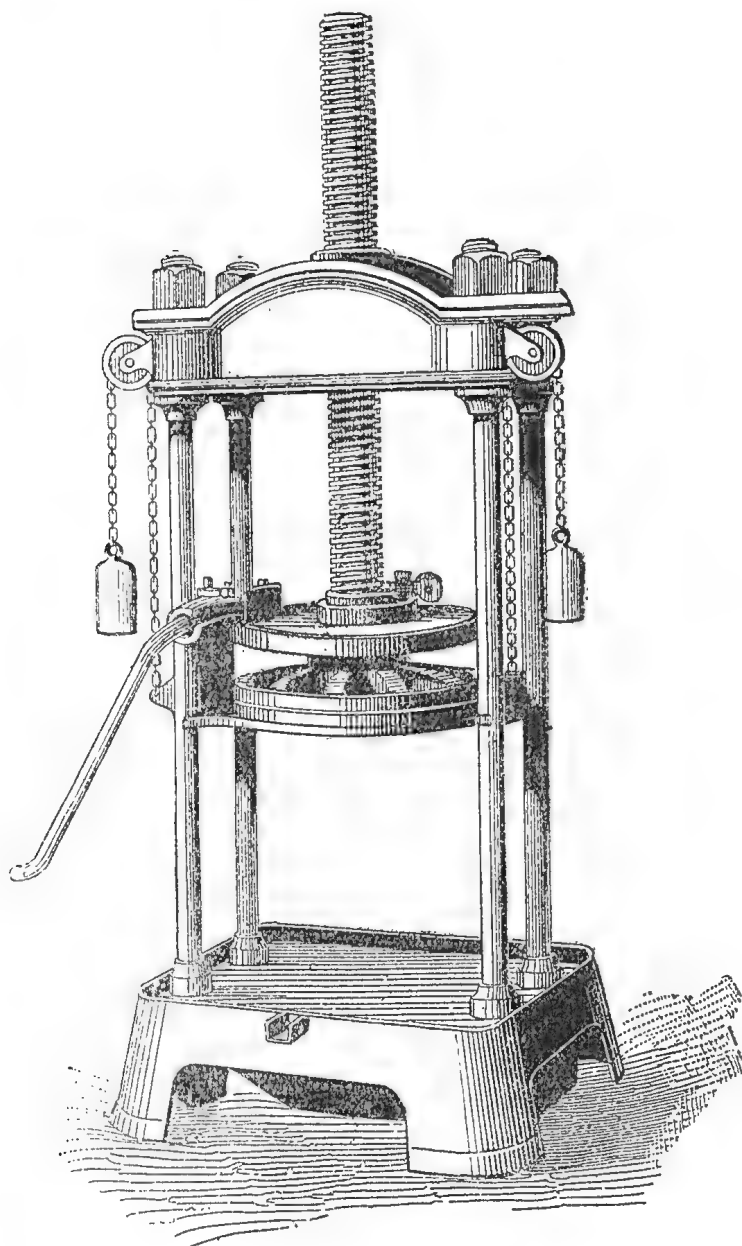


Plate XX.



AN OIL MILL.

1,000 lb. of seed about 50 gallons of oil are produced. Thus, if the produce of 1 acre of castor oil plants is 1,000 lb., the return would be £7 10s. But this is merely an approximate return, which must necessarily vary under different conditions. The first oil expressed—*i.e.*, that known as "cold-drawn"—is the medicinal oil, which sells at a much higher price than the second and third qualities.



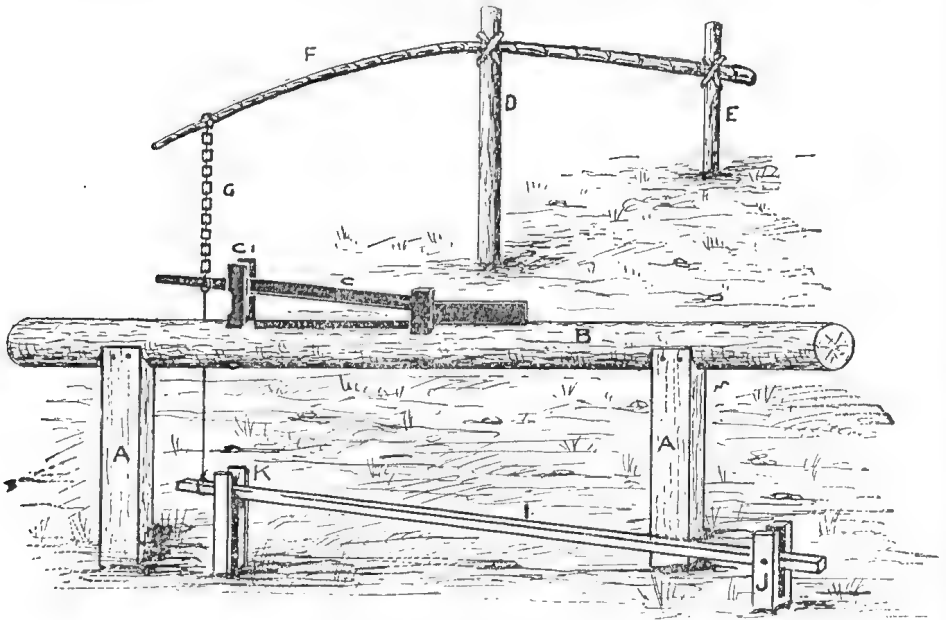
In the illustration the male flowers are seen on the lower portion of the spike, and the female flowers above.

The oil presses illustrated are reproduced from the *Agricultural Gazette* of New South Wales.

A SIMPLE MACHINE FOR EXTRACTING PLANTAIN FIBRE.

We have already pointed out the great waste which is going on in the banana plantations of Queensland by the non-utilisation of the valuable fibre contained in the stalks of banana plants, which, having borne fruit, are cut down and left on the ground to sour the soil and become the safe breeding grounds for many insect and fungus pests. From every acre of banana plants 1 ton of fibre, worth from £25 to £35 per ton, may be obtained. Every banana stem will give $1\frac{3}{4}$ lb. of fibre. The cost of manipulating the stems by a hand machine, such as is here described, is about £5 per acre.

From an article on the subject in the *Ceylon Tropical Agriculturist*, we take the accompanying illustration and the following extracts:—



EXPLANATION OF SKETCH.

a—a. Two posts fixed in the ground to support the horizontal beam *b*. The beam is fastened securely to the posts by eight stout nails.

b. Round wooden beam, 8 feet in length by 6 inches in diameter, fixed horizontally on supports *a—a*, with its upper surface at a height of about 2 feet 7 inches from the ground.

c. Iron knife, about 9 lb. in weight and $3\frac{1}{2}$ feet in length, with a blunt edge, fixed on an axle to the beam *b*. The blade of the knife should close firmly, and very evenly, on to an iron sole-plate, 15 inches in length by 2 inches in width, and $\frac{1}{2}$ -inch in thickness, which is secured to the beam *b* by two screws.

c (1). Wooden block fixed in the beam *b* with a deep groove cut in it to accommodate the handle of the knife *c*, for the purpose of keeping it steady. The groove allows the handle to be moved up and down freely, but prevents it from being moved to an undesirable extent laterally.

d. Post fixed in the ground at right angles to the beam *b*, at a distance of 6 feet from the latter. The post should stand about $4\frac{1}{4}$ feet above the ground level for the purpose of supporting the pole *f*.

e. Post driven into the ground firmly at a distance of about 6 feet from *d*, and standing about $1\frac{1}{2}$ feet above the ground, for the purpose of tying the base of the pole *f* to.

f. Bamboo or other strong supple pole, about 14 feet in length, tied to the two posts *d* and *e*, so as to act as a strong spring, to which the handle of the knife *c* is connected by a chain.

g. Chain, connecting *f* with *c*, which can be lengthened or shortened as is found necessary in order to obtain the desired pressure of the blade of the knife on the fibre; 1 foot 7 inches to 1 foot 10 inches will be found a useful working range of length of the chain, or distance between the end of the bamboo *f* and the end of the knife *c*.

h. Piece of wire fixed to the end of the knife *c*, then passing through a hole made in the beam *b*, and tied to the end of a long, straight stick or bamboo *i*.

i. Bamboo or stick, about $7\frac{1}{2}$ feet in length, which is supported by the wire *h* at one end, and by a brick, stone, or piece of wood *j* at the other, so as to serve the purpose of a pedal. When the foot is placed on the stick with a little pressure, the handle of the knife *c* is depressed and the blade is thereby opened for the reception of a strip of plantain, which it is intended to clean.

k. Two small stakes driven into the ground and standing about 15 inches in height to serve as guides for keeping the pedal *i* steady.

j. Brick, stone, or piece of wood to support the end of the pedal *i* about 3 inches above the ground.

Having got the machine or machines fitted up, the next thing to do is to see that the knife-blade fits very evenly and correctly on the flat, iron sole-plate. On no account must the edge of the knife be too sharp, otherwise the fibre will be cut or broken. Having got the knife of the requisite bluntness, the next thing to be considered is the pressure exercised by the spring *f*. A little experience will enable the operator to adjust the pressure to the exact degree that is required to get the best results out of the machine. If the pressure is too great, the fibre will be unduly strained and broken more or less. If, on the other hand, the pressure is insufficient, an unnecessary number of strokes have to be given to get the fibre clean. It is, therefore, a most important matter to adjust correctly the pressure of the knife-blade. For this purpose, a chain is better suited than a cord to connect the knife handle *c* and the spring *f*, as the individual links furnish an easy means of graduating the shortening or lengthening of the chain, so that almost any degree of pressure that may be desired can be readily obtained.

It may be mentioned that the fibre obtained from plantain stems which have been grown in full sunlight is considerably stronger than that obtained from stems which have been grown under the shade of trees or in shady situations.

The plantain stems should be cut into $3\frac{1}{2}$ feet lengths; each length should be opened up into its component parts, and the component parts should be split into strips, $1\frac{1}{2}$ to 2 inches in width. The strips are now ready for being cleaned; and it is advisable that they should be cleaned the same day as the stems are cut down. It will be found that the inner, white and tender, strips are very much easier to clean than the outer green-coloured strips. The inner strips yield a fine, soft, yet strong, fibre, while the green-coloured strips yield a rather coarse fibre. It is, therefore, advisable to reject the two or three outermost component parts (leaf stalks) of the plantain stem, as they are, as a rule, difficult to clean.

The operator should now take a strip in his hands, and place his foot on the pedal (*i*) to open the knife. Then place the strip, inner side uppermost, on the iron sole-plate under the open knife, keeping hold of about 6 or 7 inches of the end of the strip, and then allow the knife-blade to close carefully on the strip by taking the foot off the pedal. Now, with both hands the operator should draw the strip, with a good steady pull, through between the blade of the knife and the iron sole-plate. The strip should be passed under the knife two or three times, inner side uppermost, and then a few times outer side

uppermost; and, if the pressure on the knife has been correctly adjusted, the strip should be cleaned in about half a dozen or fewer strokes. Having cleaned one end of the strip, which will now appear as clean fibre, the other end which was held in the hand should be cleaned. Place it under the knife, inner side uppermost, leaving about $\frac{1}{2}$ -inch to be cleaned by the second and subsequent strokes, and draw it through quickly. After three or four strokes the fibre will appear quite clean. Now hold the piece of fibre in the centre and give it three or four sharp shakes; then hang it up on a string or bamboo, fixed horizontally at a height of, say, $5\frac{1}{2}$ feet from the ground, in a shady place conveniently close to the machine to dry. If the day be fine and bright, the fibre will dry in a few minutes, but it should be allowed to hang for several hours to dry it thoroughly. As soon as it is dry it can be made into cords or ropes or stored away for future use.

The machine here illustrated is a very primitive, simply-constructed affair, but there is no reason to doubt that engineers and machine-makers could very soon effect great improvements in it, perhaps even to doing away with the hand labour of drawing the plantain strips under the knife.—Ed. Q.A.J.

Times of Sunrise and Sunset, 1904.

DATE.	JANUARY.		FEBRUARY.		MARCH.		APRIL.		PHASES OF THE MOON.
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	
1.	4 57	6 45	5 21	6 42	5 42	6 19	5 58	5 46	3 Jan. ○ Full Moon 3 47 p.m.
2	4 58	6 46	5 22	6 42	5 42	6 18	5 59	5 45	10 " ☾ Last Quarter 7 10 a.m.
3	4 58	6 46	5 22	6 42	5 43	6 17	6 0	5 44	18 " ☾ New Moon 1 46 "
4	4 59	6 46	5 23	6 41	5 44	6 16	6 0	5 43	26 " ☾ First Quarter 6 41 "
5	5 0	6 46	5 24	6 40	5 44	6 15	6 0	5 42	
6	5 0	6 46	5 24	6 40	5 44	6 14	6 1	5 40	
7	5 1	6 47	5 25	6 39	5 45	6 13	6 1	5 39	2 Feb. ○ Full Moon 2 33 a.m.
8	5 2	6 47	5 26	6 38	5 45	6 12	6 1	5 38	8 " ☾ Last Quarter 7 56 p.m.
9	5 3	6 47	5 27	6 37	5 46	6 11	6 2	5 37	16 " ☾ New Moon 9 4 "
10	5 3	6 47	5 28	6 36	5 47	6 10	6 2	5 36	24 " ☾ First Quarter 9 8 "
11	5 4	6 47	5 29	6 35	5 47	6 9	6 3	5 35	
12	5 4	6 48	5 29	6 35	5 48	6 8	6 4	5 34	
13	5 5	6 47	5 30	6 34	5 49	6 7	6 4	5 33	2 Mar. ○ Full Moon 0 48 p.m.
14	5 6	6 47	5 30	6 34	5 50	6 6	6 5	5 32	9 " ☾ Last Quarter 11 0 "
15	5 7	6 47	5 31	6 33	5 50	6 4	6 5	5 31	17 " ☾ New Moon 3 39 "
16	5 8	6 47	5 32	6 32	5 51	6 3	6 6	5 30	25 " ☾ First Quarter 7 36 a.m.
17	5 9	6 46	5 32	6 32	5 51	6 2	6 7	5 29	31 " ○ Full Moon 10 44 p.m.
18	5 10	6 46	5 33	6 31	5 51	6 1	6 7	5 28	
19	5 11	6 46	5 34	6 30	5 52	6 0	6 7	5 27	8 April ☾ Last Quarter 3 53 a.m.
20	5 11	6 46	5 35	6 29	5 52	5 59	6 8	5 26	16 " ☾ New Moon 7 53 "
21	5 12	6 46	5 35	6 28	5 52	5 58	6 9	5 25	23 " ☾ First Quarter 2 54 p.m.
22	5 12	6 46	5 36	6 27	5 53	5 57	6 9	5 24	30 " ○ Full Moon 8 36 a.m.
23	5 13	6 46	5 37	6 26	5 54	5 56	6 10	5 23	
24	5 14	6 45	5 38	6 25	5 54	5 55	6 10	5 22	
25	5 15	6 45	5 39	6 24	5 55	5 54	6 11	5 21	
26	5 16	6 44	5 40	6 23	5 55	5 53	6 11	5 21	
27	5 17	6 44	5 40	6 22	5 55	5 52	6 12	5 20	
28	5 18	6 44	5 41	6 21	5 56	5 50	6 12	5 19	
29	5 19	6 43	5 41	6 20	5 57	5 49	6 13	5 18	
30	5 19	6 43	...	...	5 57	5 48	6 13	5 17	
31	5 20	6 42	...	...	5 58	5 47	...	...

The approximate times for sunrise and sunset at Rockhampton, Townsville, and Cooktown may be obtained by using the table for Brisbane, and adding the following figures:—

	ROCKHAMPTON.		TOWNSVILLE.		COOKTOWN.	
1904.	Rise.	Set.	Rise.	Set.	Rise.	Set.
January	18 m.	2 m.	42 m.	12 m.	53 m.	9 m.
February	15 m.	5 m.	36 m.	18 m.	44 m.	18 m.
March 1 to 20	11 m.	9 m.	29 m.	25 m.	35 m.	27 m.
" 21 to 31	9 m.	11 m.	28 m.	26 m.	29 m.	33 m.
April	7 m.	13 m.	20 m.	34 m.	21 m.	41 m.

Science.

TECHNICAL EDUCATION.

Last month we published an address on technical education by Dr. Walter Maxwell, which differs so greatly in composition and deductions from nearly all other literature on the subject that it is entitled to more than mere passing notice. It might almost be thought that the writer had taken for his keynote some lines in Martin Tupper's Proverbial Philosophy, on "Invention," which may well find a place in a criticism on the address:—

"By Culture man may do all things, short of the miracle—Creation;
Here is the limit of thy power—here let thy pride be stayed;
The soil may be rich and the mind may be active, but neither yield unsown;
The eye cannot make light, nor the mind make spirit;
Therefore it is wise in man to name all novelty, Invention;
For it is to find out things that are—not to create the unexisting;
It is to cling to contiguities, to be keen in catching likeness,
And with energetic elasticity, to leap the gulphs of contrast.
The globe knoweth not increase, either of matter or spirit;
Actions and thoughts are used again, mixing in varied combinations;
And though, by moulding them anew, thou makest them thine own,
Yet have they served thousands, and all their mint is of God."

Here, as we have said, we find the thought elaborated in the simple but elegant and eloquent language of the address. It begins with the dark ages of history, and it leads the reader step by step from idea to idea—evolution is the dominant note. Technology, it is pointed out, follows upon the footsteps of physical science, the latter "comprehending the several divisions of investigation which treat of the elements and composition of matter, and of the laws which govern existence in its various and changing forms"; the latter is, "the great harvester of the discoveries and fruits of these sciences receiving their findings and devoting them to industrial use. Technology, therefore, rests upon natural laws, and its progress follows their discovery, understanding, and control." Generation after generation has rolled away; age after age has swept silently by, but each has swelled by its contribution the stream of discovery. One barrier after another has given way to the force of intellect; mysterious movements of earth and other planets have been unravelled; mighty laws in the sciences have been revealed, and the human mind has mounted, step by step, up the rocky height of the self-built pyramid. To trace the efforts of the human mind in this long and ardent struggle, to reveal its hopes and fears, its long years of patient examination and research—these are the aims and objects of technical education. Can the man of science, in whatever branch he may elect to study, be evolved in a day, in a year, in a decade? No, the great discoveries made since Newton discovered the laws of gravitation, Joseph Black the nature of carbonic acid gas, Cavendish the properties of hydrogen, are the result of life-long arduous study, and those who have applied and are yet to apply the discoveries in science to the operations of the commercial world cannot expect to be successful unless they give up everything to an all-absorbing, laborious study of physical laws and of the means by which they may be made to increase the wealth of the nation and lighten the labours of the worker.

Wherever we turn we see the spirit of commercial thrift turning to account the labours of the chemist, by which waste substances are turned into gold. Amongst these waste substances was one called arsenical pyrites or mundic.

For years vast mounds of this material lay round the copper-mines of Devonshire and Cornwall. By the help of chemical research all this has been turned to valuable commercial account; £6,000,000 worth of an unsuspected mineral was looked upon as waste until the chemist came on the scene and showed how the valuable sulphur and soda could be extracted from it by first driving off the sulphuretted hydrogen and then burning it in specially contrived furnaces, when the sulphur was deposited in almost native purity.

During the last century the chief phase of commercial thrift is presented in the methods which have been devised by the chemists for utilising such waste products which were flung away as so much useless material. Chemical science has been the chief pioneer and assistant in this important work. Consider the scoriæ or slag from the blast furnaces and coal tar, a product resulting from the manufacture of gas. Here striking instances are seen, in dealing with which modern chemistry has gained some of the greatest triumphs of mind over matter.

By the aid of science the slag has been turned to profitable account in many ways, one of which is the preparation from it of a valuable manure for the land in the form of phosphoric acid.

Coal tar has been found to be an abundant source of benzine, a compound of carbon and hydrogen discovered in 1825 by the illustrious chemist, Michael Faraday. This material is now of very great commercial importance as the source of colours for dyeing. Perkin, an English student of chemistry, discovered in coal tar the exquisite colour known as mauve, and this led to the production of many brilliant aniline dyes. To the chemist also we owe that valuable product of coal tar—alizarin, worth many pounds sterling per ton, which supersedes the vegetable dye, madder. By Black's discovery of the theory of latent heat, Watt was led to the investigation of steam as a motive power.

One of the great new scientific doctrines which have been established during recent times is that called "the conservation of energy," a principle to the effect that no system of matter can vary in the total amount of energy or working power which it contains, unless it parts with energy to or receives energy from some outside body. This great truth, approached by Sir Isaac Newton in his *Principia*, and nearly reached by Count Rumford and Sir Humphry Davy in their experiment on heat and its cause, which was by them rightly declared to be motion, was finally established by one of our greatest physical philosophers, Mr. J. P. Joule, a pupil of Dalton. In 1840 he began to study the subject of heat, and he ended by determining its mechanical equivalent in the formula, "That the expenditure of mechanical energy represented by the raising of 772 lb. through 1 foot of space, against gravity, is needed to produce heat, increasing the temperature of 1 lb. of water by 1 degree of Fahr."

In no department of human progress have those mighty magicians—steam, coal, and iron—made a more wondrous change in the conquests effected over natural forces on the pathless sea. And all is due originally to the labours of the chemist, whose investigations and deductions have been seized upon by inventors who applied them to commercial uses.

In 1856, Sir Henry Bessemer improved the process of steel manufacture by forcing a blast of air at high pressure through molten pig-iron. Never was there a grander scientific discovery in metallurgy than the Bessemer process. Sir William Siemens again, a native of Hanover, a man always actively engaged in researches in heat, metallurgy, telegraphy, electric lighting, and electric locomotion, produced, in 1856, his regenerative furnace, an ingenious device for saving heat in many industrial processes, especially in the process of making steel.

We cannot but realise what has been done for the industrial world by the inventor. When we consider in detail the remarkable electro-chemical work being done at Niagara Falls in reducing nitrogen from the atmosphere and in

combining new materials for use in the industrial arts; the discovery of a process for the artificial production of camphor, a method which will render us, in a measure, independent of the Formosan camphor monopoly; Cooper Hewitt's static converter (the outcome of his brilliant experiments with the mercury vapour tubes), by which a small glass bulb will take the place of the bulky and expensive static converters which form so costly an element in our system of electric power and light production and distribution; the experiments made during the last year in electrical canal haulage, which have been so successful as to render it likely that in the near future the trolley will take the place of the mule on the tow-path; that beautiful invention, the telegraphone, and Rühmer's work on light-telephony, and his successful attempt to talk across a beam of light for a distance of $4\frac{1}{2}$ miles, we realise that these achievements and many others which the brilliant discoverers in the world of chemical physics whom we have mentioned have accomplished, should form an incentive and act as a vigorous stimulant to the studies which are included under the general head of Science.

We have been thus discursive on the wonders performed by patient experimenters, and the marvellous results which have accrued to commerce, to agriculture, mining, and to domestic economy and sanitation as the outcome of their work, because we wish to draw the attention of students at our technical colleges to the long years of patient industry and study, to the disappointments, and resulting determination to compel Nature to yield up her inmost secrets which have characterised the labours of chemists and inventors.

Whilst we have no word to say against the teaching as embodied in the syllabus of the technical colleges, we would ask students to remember that when they take up half a dozen subjects they do it at the expense of accurate knowledge of any one of them. They should also bear in mind that the acquisition of a college diploma after a three-years' course of evening study no more qualifies them to consider their scientific education as complete than does the driving of a winding-engine on the night shift of a mine constitute the engine-driver a competent scientific engineer. Science demands a life-long study—the application of the discoveries of scientific men demands years of study before ultimate success is attained. Of the hundreds or, perhaps, thousands of young men who have gone through a course of technical education, how many names are enrolled on the lists of scientific discoverers?

As Dr. Maxwell truly says in his address:—

"Instruction may be primary, or advanced, or ultimate and complete. In the more advanced forms of a general school education, the elements of the sciences could be taught with high advantage as subjects of the natural knowledge that should be a part of the general mental outfit which all youths should have in stepping out into life. Again, some tuition and practice in the common mechanical arts, such as mechanical drawing, carpentry, and similar things, can be of very special help to those greater numbers who will have to follow everyday vocations. In the school systems of Germany, Switzerland, and of some other countries, the natural knowledge or primary tuition in the sciences of which we have spoken occupies a definitely adjusted place, while the more practical exercise in elementary mechanical things is provided for in their 'Industrial Schools.' These primary kinds of instruction, however, do not in any sense reach up to or come within the systems of modern technical education which are followed by students at the great technical institutions, such as are found at Boston, Zürich, and Berlin. Elementary natural knowledge should be a part of common education, as arithmetic is a part of it; and common training in mechanical practice should be for all who have to exercise the common arts of life. But technical education must always be for the relative few who are to become the directors of existing and the discoverers of future technical processes that are to govern the great industrial undertakings of modern times. And this technical education for the few should include all that was known in the past and that is practised to-day. It must consist in an all-covering know-

ledge of the laws and of the practice of technology as it is comprehended at this time. And, for the material advantage and progress of a country along those lines of business and commerce that are controlled by modern technical process, it were better that five of its rising citizens should be educated and trained thus profoundly than that 5,000 should be furnished with a measure of such knowledge that is too indefinite and small to be put into actual business and use."

We do not make these remarks with a view to disparaging the work of the technical colleges. On the contrary, we think they are doing a good work in certain directions on certain lines. But are those lines such as may entitle students to consider themselves thoroughly educated in technology after a three-years' course? We think not. A few may emerge from the numbers enrolled on the college books, and continue to devote themselves to the higher and more intricate studies in the realm of science, but the greater number, owing to the force of circumstances, of which independent means are not the least, will be content with a smattering of half a dozen sciences, be masters of none, and possibly will exemplify the old adage that "a little learning is a dangerous thing."

BUSH HAY CONSERVATION AT QUAMBONE.

Quambone, a fine pastoral property in the Coonamble district, since being purchased by Messrs. Wm. Cooper and Nephews, of England, has been the scene of enterprising operations.

Mr. John Hain, who manages the estate, has not let the drought pass without heeding some of its lessons. Having a free hand in the management of affairs, he has taken practical steps to mitigate the effects of future droughts. He has had six bores put down on the property, and the general operations are setting an example to all in the back country. This year thousands of tons of bush hay have been cut and stacked, and the value of this is hardly realised. Recent experience has shown that 1 lb. of prime herbage hay will go further and do more good as sheep feed than half as much again of artificial fodder, and being so cheap and easy to make and keep, it is surprising that more pastoralists do not follow this example and do likewise during such a splendid season. A plentiful supply of fodder has its value discounted if one has to pay a high rate per ton railage, hence Mr. Hain's enterprise in having thousands of tons of bush hay snugly stored just where it will be required will be well rewarded when the next bad season comes along.—*Pastoralists' Review*.

COCOANUT-TREE DISEASES.

To exterminate the beetles and other insects on any given cocoanut area, Mr. R. L. Holmes, Fiji, who has lately been writing some articles in an exchange on the cocoanut-tree and its diseases, asks how the following treatment would do:—Cut off all fronds close in, except the unexpanded heart leaves, that seem always to be healthy; protect the latter, and burn off the fibrous tissue that surrounds the trees and supports the fronds. It is very inflammable on a dry windy day. Shake in some insect-destroying powder into the cavities and round the base of the fronds. Next burn off everything that will burn on the ground, old and new fronds, grass, scrub, and all rubbish near the trees and for some distance away, the further the better. Fork up the ground for a few fathoms wide round the butts of the trees, and shake in some lime and salt. No fear need be entertained of the trees suffering permanent injury from close cutting of the fronds.

Animal Pathology.

TRISTEZA, OR TEXAS FEVER.

A correspondent asks us to republish the pamphlet on Tristeza in the Argentine, which appeared in this *Journal* as a translation from the French, by the editor, of an article in the *Recueil de Médecine Vétérinaire*, by M. Lignières.

The article is an extremely lengthy one, and contains such a quantity of scientific matter, which would hardly be understood by the ordinary reader, that we think it better to give our correspondent a plain and clear account of the fever, its symptoms, and the remedies which appears in a late number of the journal of the *Jamaica Agricultural Society*:—

TEXAS CATTLE FEVER.

Texas fever is known under various names, such as "southern cattle fever," "Spanish fever," "redwater disease," "bloody murrain," "acclimation fever," "splenic fever," "cattle distemper." The disease occurs in its most virulent form during the six months when heat and other devitalising conditions are prevalent. At other times of the year it is milder and exists in the chronic form. In the acute form the symptoms are about as follows:—A fever which may reach to 108 degrees Fahr. appears in all adult animals which have been herded together, several days before they are noticeably sick. During the first two or three days the temperature will be a degree or two higher in the evening; then the morning temperature will gradually rise, and the fever remains permanent for seven or eight days, when the animal either dies or recovery begins. In either case the fall of the temperature to normal, or even below normal, is as sudden as was the onset. The respirations are increased from 20 or more, the normal, to 75, and the pulse from 60 or more to 100 per minute. There is loss of appetite, and emaciation is rapid, even continuing after the fever has ceased. In severe cases, and in most cases that will terminate fatally, the urine is wine-coloured or blackish from the presence in it of the colouring matter of the blood—a condition known as hæmoglobinuria or "redwater." The bowels are usually constipated during the fever, but when this subsides a diarrhoea may set in, the feces being of yellowish colour. During the fever there is partial loss of vision, some delirium and staggering gait from weakness, which may be so great that the animal is unable to rise when down. The blood is very thin and pale in colour. In some instances it is with considerable difficulty that a drop can be obtained from incisions made into the skin for purposes of microscopic examination.

In the chronic form of the disease all the symptoms described above as occurring in the acute attacks are milder in character and are prolonged. The temperature rarely goes above 105 degrees Fahr. in the evening, while it is about normal in the morning. "Redwater" is not present as a symptom. The blood disease goes on, but is less rapid in its effects. In fact, the chronic form of the disease could hardly be diagnosed during life, without the aid of the microscope, and not even then in some cases. It is not fatal as a rule, and the animal makes a slow recovery, after being "out of condition" for a month or two. Frequently after an acute attack has subsided, a relapse may occur, but it is generally mild in character.

Texas fever, being a blood disease, we find upon opening a dead animal alterations in blood and blood-elaborating glands as being the most noticeable features, the liver being enlarged and stagnated with bile, which gives it a yellow colour. The spleen is very much larger than is normal, and is filled with a dark, tarry substance. If held up by the end for some time, its contents may

gravitate. The heart and kidneys will show upon their surfaces the effects of the intense fever in the presence of blood spots. The lungs, stomach, and bowels in acute cases are generally somewhat reddened. The mannyplies will be impacted, and the lining will peel off. The bladder in these cases contains a cherry or wine coloured liquid. The blood will be thin, but will coagulate. There will be no disease of the skin or swellings on the body as occur in some other diseases, notably as in anthrax, which has some symptoms resembling those of Texas fever. The gall-bladder will contain, instead of the usual green, free-flowing liquid, a dark semi-coloured mass.

The presence of the foregoing symptoms and *post-mortem* appearance in animals dying or dead of a mysterious disease is sufficient to cause one to suspect Texas fever. Additional evidence would be had, if at the same time the cattle-tick were found upon the animal, or if close examination of the skin of the udder, escutcheon, or dewlap showed little, reddened, rough areas caused by the tick bites.

If more scientific methods can be applied, a microscopic examination of the blood will show an enormous decrease of the red-blood corpuscles, from 5,000,000 per cubic millimeter, the normal number, to as low as 2,000,000 per cubic millimeter. The corpuscles will also exhibit great changes in size and shape. They will appear shrivelled and crenated. If a drop of the blood be smeared upon a piece of glass, allowed to dry, subsequently wetted with methylene blue, and examined with a microscope of 1,000 diameters, the real cause of the disease can be observed. The larger white corpuscles will be stained blue, as will also any bacteria which may be present. The red cells will not have taken up the stain, but will appear as round, yellowish, transparent bodies much smaller than the white corpuscles. Frequently inside the red corpuscles will be noted very small blue-stained points; sometimes they may be larger, pear-shaped, and in pairs. The same bodies are also found outside the red corpuscles. This little body is the cause of the fever. It lives inside the red cells, destroys them, and finally kills the animal. It is its destruction of the red cells of the blood, and the efforts of the kidneys to eliminate the *débris* thus formed from the blood, that causes the red water contained in the bladder, and gives rise to the name "redwater disease" used by some persons. The little speck mentioned above is an animal—the lowest form of animal—and consists of a single cell. It is a member of the group Protozoa, and has been named by Professor Smith, its discoverer, *Pyrosoma bigeminum*. This parasite is harboured and transported by the ordinary cattle tick, whose ancestors passed their lives upon a cattle infected with the germ of Texas fever. Whether or not the tick is the only carrier of Texas fever is not known; but there seems to be no reason why any insect which had bitten infected cattle could not carry the disease to a susceptible animal. It is now known that the cattle tick can be deprived of its power to produce Texas fever by being reared upon animals which are insusceptible to the disease.

The cattle tick has a very large distribution, but the distribution is limited to those regions where the winters are not severe enough to freeze the eggs. All the cattle in the United States raised in the country lying south of the so-called Texas fever line, or, in other words, all cattle which from birth have supported successive crops of ticks, possess a certain amount of immunity against the fever. Therefore, southern cattle are generally immune to Texas fever. However, Texas fever probably kills more southern cattle than any other disease, because, *when the acquired immunity is not backed up by a strong constitution, or when the animal gets "out of condition," it loses the power to withstand the infection, and then succumbs to the disease when a heavy infestation with ticks occurs.* Experiments have shown that two or three hundred ticks are a sufficient number to cause the disease. Stockmen know that many times this number can be counted on animals which are considered only moderately infested. It has been before the dry weather noticed that the first crop

of ticks is not as virulent as succeeding crops. This would indicate that the crop of ticks hatched from the egg carried over from the previous season either carry the parasite in a weakened condition or in an undeveloped stage, or that it is necessary for the ticks themselves to become reinfested by sucking the blood of animals which are permanently infected with the germ of Texas fever. Experiments made by the Bureau of Animal Industry, U.S.A., show that a southern animal may be carried north and kept there free of ticks for many years, and yet be capable of producing Texas fever, if some of its blood be injected into a northern susceptible animal. The life history of the cattle tick is briefly as follows:—The ripe female falls off the cattle, and lays eggs for two weeks, when hatching begins, which occupies about three weeks, more or less, according to the temperature. The young ticks crawl up grass stalks or low bush, and when opportunity occurs attach themselves to passing cattle, and remain on them for three or four weeks, by which time they in turn have reached the adult stage, or are ripe, and fall off. The young ticks may live for nearly a year under favourable conditions of warmth and moisture, or the eggs may not hatch out for three months in the absence of these. *They finally die, however, of starvation if they can find no cattle, as they cannot live upon vegetable food, nor can they grow to the adult size, except when nourished by the blood of cattle.* [This is a most important statement, as here ticks infest other animals, even mongoose and toads.—Ed.] When first hatched out, ticks are almost too small to be seen by the unaided eye. Certainly it would be difficult to find them. Therefore, when the ticks have developed in size sufficiently to be found even upon rather close inspection, they have probably infected the animal. Ticks are carried from place to place by cattle; they never crawl far away from the place where they are hatched. Bunches sometimes may be found upon the end of a blade of grass, and be blown some distance, or be carried by other means. *They have never been known to cross a fence where the bottom rail rested upon the ground.* [Another most important point.—Ed.] One field may, therefore, be infested, and another not. Only the young ticks can attach themselves to animals; the old ones being unable to crawl against the hair.

After the foregoing statement concerning Texas fever and its cause, the question of most importance to penkeepers is what can be adopted in order to safely and profitably bring the improved cattle from the north here for breeding purposes. Countries where the climate is not cold enough to kill off the ticks are all dangerous for stock. The infective agent is, then, with us all times. But in place of a winter we have seasons of heavy rains, such as May and October, and in many districts heavy rains are frequent between these months. It is from January to May, when all our Jamaica dry weather prevails, that is our dangerous times.

It is known that young calves, while they may take the disease, have it in a mild form. This applies to the southern as well as to the northern calf, and it is the successive infestations of the southern animal from birth with the cattle tick which confers a degree of immunity sufficient to prevent them from contracting a fatal case of the disease, if well cared for. It must be, then, plain to the reader that the safest age at which northern cattle (and by northern cattle is meant those cattle coming from any part of the United States where the cattle tick is not found—and the tick is not found in Europe) can be brought south is as soon as they can be weaned, or at the age of six months or less. Weaning should be commenced earlier, however, in order to accustom the calf's stomach to the herbaceous diet. A calf partly weaned could, after its arrival here, be allowed a native cow for a month, receive its first natural infestation with ticks, and thus acquire immunity, the same as the southern-born animal, by subsequent infestations. It should be distinctly understood that no bovine, be it southern or northern, is safe against Texas fever, unless it has been infested with ticks or immunised by artificial means to be described.

Our native-born cattle, reared upon tick-free pastures, are as liable to take the disease and die as the northern animals. Hence it is better to allow a moderate infestation with ticks of all cattle from birth, since an infestation occurring for the first time in adult life would very likely kill the animal.

The other method of immunising susceptible cattle against Texas fever was first suggested and practised by Drs. Smith and Kilborne, as shown in their report upon the disease in 1892. It consists of the injection under the skin or into the jugular vein of a northern animal, of a small quantity of blood from a southern animal. This method, or slight modifications of it, has been employed with success in Australia and in the United States by several of the State Experiment Stations. Until more experience has been gained upon the subject, the operation should only be performed by a skilful veterinarian or layman who realises the forces he is dealing with. In particular the method as now employed is as follows:—The animal which is to supply the blood should be healthy, three or four years old, and must have supported successive crops of ticks from birth. Such an animal is easily found here. The hair is shaven from the neck over the jugular vein; the neck is washed with soap, 5 per cent. solution of carbolic acid, and then with water which has been boiled. Put a strap round the neck and draw it tight. Place under it and over the jugular vein a block about 1 inch square. This will cause the vein to swell. Insert into the jugular a large hypodermic needle, to which is attached a small piece of rubber tubing, both of which have been previously boiled. The needle must point towards the head. Blood will now flow, and it is to be caught in a clean tumbler, and stirred with a small bundle of wire or other material. After stirring for a minute or two, fibrin will collect upon the stirrer, and the blood will have lost its coagulability. Then strain the blood through a piece of cheesecloth tied on to the top of a second tumbler. The blood is now ready for infection. A 1 cc. syringe with hypodermic needles of sufficient strength for the work is filled with the blood, and the contents are injected under the skin of the shoulder of the animal to be inoculated. The place of inoculation should be cleaned in the same manner as that from which the blood was obtained. It is also of paramount importance that the blood be kept milk warm during the process. This is best accomplished by standing the tumblers in a pan of warm water. The syringe and all utensils should be thoroughly freed of blood, and washed in 2 per cent. of carbolic acid solution after the work is over. The operation must, on no account, be delayed after the blood is drawn. Sixty days after the first dose, a second dose of 2 cc. should be given in the same manner as the first; although some have given only a single dose, it stands to reason that a second one would fortify the initial immunity. The second dose is indicated in animals whose temperature did not rise to 105 Fahr. In a typical case of the fever produced by this means, the fever commences in a week, showing a rise to 106 Fahr., which continues for from five to fifteen days more, when it falls to the normal, but 102 Fahr. About the thirtieth day after injection a secondary milder fever lasting several days will occur.

The best time for the work is between 1st November* and the following 1st March, never during the hottest weather. It is advised to allow a mild infestation with ticks two months after inoculation, and keeping off an excess of ticks during the hottest months. This can be done by pasturing the fields where ticks are known not to be plentiful, or by applying once weekly to the dewlap, udder, and escutcheon crude Beaumont oil or 20 per cent. kerosene oil emulsion.

The statistics of Dr. Francis, of the Texas Experiment Station, given by Dr. Gary, show that 1,500 animals inoculated by him only 3½ per cent. died from inoculation fever, and less than 7 per cent. by exposure; and after they had recovered from the blood inoculation, a loss of about 10 per cent. The animals

* The corresponding season in Queensland is April to July.—Ed. Q.A.J.

were placed in large pastures, where no attempt was made to keep down excessive infestation. At the same time, northern animals placed upon the same pastures, without being immunised, had a mortality of 50 to 90 per cent. It is possible that, where the infestation subsequent to inoculation can be governed, a still smaller percentage of loss would occur. The ages of the animals ranged from a few months to two years; yearlings being preferred. As regards the medicinal treatment of Texas fever, there is unfortunately little to be said. Such havoc is played with the blood that the animal has very little chance of recovering. Being a blood disease, one would naturally turn to the medical agents, which are known as blood medicines. Foremost among these is iron. Then the stomach tonics should be added to promote the appetite, a good one being gentian. The addition of quinine to combat the fever and nux vomica for its general effect as a tonic would be rational addition. Some prescribe saline purges, but personally. I cannot agree unless a purge is urgently required, as we have a disease which is wasting the blood, and such purges only promote the waste. Were it possible to transfuse a considerable quantity of blood from a healthy immune native animal into the veins of the sick one, it is probable that a beneficial effect, or even a cure and thorough immunisation would result. The above is entirely practicable, and should be given a trial.

A remedy which combine the above indicates medicinal agents might tide an animal over a critical period, and help to bring about a recovery, could be prescribed and used as follows:—Take of sulphate of iron and powdered gentian, 3 oz. each; sulphate of quinine, 6 drams; and of nux vomica, 1 oz. Mix and divide into twelve powders. Give each animal one powder three times a day, made into a paste with syrup, placing upon the tongue by the means of a small paddle. House the animals at night. Provide plenty of fresh water, and give soft food. If constipated, give rectal injections of oil or castile soap water. If bloating occurs, give $\frac{1}{2}$ oz. chloride of lime dissolved in $\frac{1}{2}$ pint of tepid water, every half hour, until relieved. It may be well to state here also that Texas cattle fever never attacks any other animals than cattle. Carcasses are absolutely harmless so far as the power to perpetuate the disease is concerned. The virus is not carried to other cattle by means of carnivorous birds or animals. In order for the dead animal to become a source of infection, some of its blood would have to be carried by biting insects and inoculated into the skin of a susceptible bovine. Cattle have been drenched with the blood of an animal dead from the disease, and no harm resulted.

REMEDY FOR TICK FEVER.

In accordance with instructions from the Chief Inspector of Stock, Mr. A. H. Cory, M.R.C.V.S., Veterinary Surgeon to the Stock Department, reports that up to the present time the best treatment he has found for cattle suffering from tick fever or redwater is as follows:—

On the first symptoms of the disease being noticed, a large dose of Epsom salts is given— $\frac{3}{4}$ lb. to $1\frac{1}{2}$ lb.—in about 5 pints of water, followed every four hours by giving 40 gr. to 60 gr. of quinine with $\frac{1}{2}$ oz. of carbonate of ammonia in a pint of cold water or gruel.

HARVESTING ON SUNDAYS.

Commenting on the extract on this subject from the *Scottish Farmer*, published in the last issue of the *Journal*, Mr. H. T. Horne, Nanango, asks us to state to all farmers who are in doubt on this point that the law as laid down in Exodus, chapter XXXIV., verse 21, is definite, and cannot be misunderstood.

We shall not revert to this subject again.

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1903.											1904.	
	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.
<i>North.</i>													
Bowen	7.65	16.44	1.44	2.04	2.77	0.31	0.22	0.51	1.36	3.14	6.13	3.45	2.65
Cairns	10.28	32.51	15.50	1.67	0.51	0.87	0.44	0.47	0.91	3.10	13.51	10.03	10.55
Geraldton	17.24	45.00	14.03	7.43	3.42	2.07	7.08	3.79	3.05	7.13	37.86	24.37	14.04
Herberton	3.69	20.80	12.04	0.64	1.00	0.19	0.33	Nil.	0.67	6.21	15.52	8.01	5.16
Hughenden	0.99	0.95	0.81	1.73	Nil.	0.07	0.31	0.65	0.80	2.36	5.30	2.71	2.80
Kamerunga	10.82	37.45	19.32	2.14	0.50	1.10	1.50	0.86	1.39	4.94	14.33	7.37	9.39
Longreach	0.09	3.48	Nil.	3.51	Nil.	0.69	Nil.	1.58	0.90	0.83	1.76	1.77	2.69
Lucinda	11.66	44.24	6.44	6.36	2.44	2.38	4.39	0.30	0.76	10.67	40.34	11.71	8.40
Mackay	6.47	13.51	1.50	6.75	2.49	2.53	0.59	0.44	1.54	9.86	5.52	16.74	3.17
Rockhampton	1.68	3.73	1.12	6.93	0.08	3.73	0.68	0.54	1.84	7.42	4.08	5.12	3.50
Townsville	8.11	19.80	1.61	2.08	1.02	0.05	0.19	0.44	2.42	5.97	19.02*	5.45	5.19
<i>South.</i>													
Barcaldine	0.40	0.94	Nil.	4.92	Nil.	0.90	0.50	4.23	1.01	4.00	0.92	3.26	0.96
Beenleigh	4.77	6.49	1.90	12.40	0.92	5.04	2.26	4.13	3.29	4.78	1.60	2.81	1.25
Biggenden	3.15	3.95	0.16	1.28	2.07	3.90	1.62	2.23	2.77	4.37	5.62	7.48	0.71
Blackall	1.50	3.87	Nil.	5.19	Nil.	1.81	0.75	2.25	0.45	2.56	1.79	2.28	3.67
Brisbane	5.35	4.79	1.33	11.82	0.73	5.56	3.84	4.73	3.65	3.98	2.19	2.65	0.77
Bundaberg	2.60	6.05	0.38	11.55	0.33	5.98	0.88	3.55	0.43	3.25	9.97	3.18	0.85
Caboolture	3.42	9.59	1.39	16.14	0.92	6.08	3.27	4.41	3.11	9.98	4.18	4.29	1.32
Charleville	0.43	2.94	1.06	2.94	0.02	1.61	0.62	3.40	0.95	2.20	2.98	1.67	2.56
Dalby	1.22	4.89	1.33	6.00	0.03	3.78	2.30	3.30	3.12	6.30	1.19	1.88	3.20
Emerald	2.49	1.48	0.26	3.43	0.02	0.67	0.24	1.28	1.90	2.21	4.30	2.70	1.26
Esk	3.51	4.46	1.25	9.27	0.30	2.97	4.21	4.86	3.69	4.02	1.43	2.37	1.86
Gatton College	3.81	2.60	0.79	7.55	0.17	4.15	2.50	3.56	4.71	5.05	1.04	2.15	1.20
Gayndah	2.08	2.30	0.09	6.03	0.05	2.81	1.06	2.62	4.37	3.03	5.12	7.01	1.83
Gindie	3.15	0.49	0.19	3.31	Nil.	0.51	0.30	1.58	1.97	4.06	4.26	1.52	1.40
Goondiwindi	0.72	4.40	1.73	5.07	0.15	4.38	2.09	4.22	2.16	3.73	3.62	2.90	2.65
Gympie	3.27	5.96	1.28	10.20	0.62	1.67	2.72	2.42	5.61	4.50	4.88	0.27	1.80
Ipwich	5.55	3.79	2.24	9.56	0.85	3.64	2.70	5.24	2.98	3.84	1.01	4.07	1.72
Laidley	3.63	2.63	0.95	8.20	0.20	4.65	3.06	4.25	5.47	3.87	1.82	2.93	1.35
Maryborough	2.76	3.23	0.66	9.58	1.60	6.17	1.09	1.83	2.62	3.96	5.04	2.64	0.56
Nambour	5.03	5.18	0.83	19.46	1.29	5.38	3.95	3.61	3.85	6.13	2.43	6.39	1.91
Nerang	4.73	4.84	3.04	15.75	2.36	7.34	2.21	3.81	3.52	3.86	4.24	3.89	0.85
Roma	0.15	2.48	0.39	3.17	0.41	2.26	1.13	6.61	1.92	3.16	4.21	1.85	0.59
Stanthorpe	1.59	0.95	1.18	6.87	0.74	4.71	1.98	6.07	3.45	4.45	2.59	2.29	1.33
Tambo	0.15	4.73	0.02	1.96	0.01	2.61	0.27	4.33	1.08	3.17	2.91	2.48	1.72
Taroom	1.53	1.29	0.82	8.83	0.23	3.83	2.21	1.51	2.05	3.78	3.22	1.39	2.70
Tewantin	5.30	11.52	1.80	20.22	7.42	7.09	5.70	5.80	2.85	9.85	1.37	3.03	2.59
Texas	0.94	0.48	1.84	4.34	0.36	4.53	3.21	4.55	2.47	4.93	4.44	1.70	3.67
Toowoomba	3.42	3.60	1.27	7.94	0.34	3.90	3.00	4.06	3.82	4.85	4.27	4.26	3.98
Warwick	2.59	2.13	0.73	8.62	0.10	5.45	2.63	3.41	2.89	3.92	2.73	0.60	2.91
Westbrook	2.70	1.52	0.31	4.23	2.53	3.89	1.63	3.89	4.03	5.11	3.75	1.46	2.82

* One day gauge overflowed.

EDGAR L. FOWLES,
For the Hydraulic Engineer.PRICES IN BRITISH MARKETS OF ARTICLES WHICH CAN BE
PRODUCED IN QUEENSLAND.

BUTTER.—Australian, 98s. to 100s., occasional lots 102s.; Danish, 117s.; New Zealand, 100s. to 102s. per cwt.; Tasmanian, 92s.

CHEESE.—Canadian, 53s. to 54s.; New Zealand, 49s. to 50s. per cwt.

CONDENSED MILK.—18s. 6d. to 20s. 6d. per case, in 20-case lots.

SUGAR (duties, raw, 2s. to 3s. 10d. per cwt.; refined, 4s. 2d. and $\frac{1}{4}$ per cent.).—Refined, £16 15s. to £17; raw, £12 10s. to £15 per ton; German beet, 88 per cent., 8s. 2d. per cwt.MOLASSES (duty, 2s. per cwt. and $\frac{1}{4}$ per cent.).—4s. 6d. to 8s. per cwt.

RICE.—Rangoon, £7 15s. to £12; Japan, £12 to £16 (rising); Java, £16 to £22; Patna, £16 to £18 per ton.

COFFEE (in bond; duty $1\frac{1}{2}$ d. per lb. and $\frac{1}{4}$ per cent.).—Ceylon plantation, 92s. to 120s.; peaberry, 60s. to 123s.; Santos, 35s. to 55s.; Mocha, 52s. to 90s.; Jamaica, 100s. to 130s. per cwt.

CHICORY ROOT, dried (duty paid).—26s. to 27s. per cwt.

ARROWROOT.—St. Vincent, $1\frac{3}{4}$ d. to $2\frac{3}{4}$ d.; Natal, $6\frac{1}{2}$ d. to 8d.; Bermuda, 1s. 4d. to 1s. 6d. per lb.

WHEAT.—Duluth, 33s. 6d. to 34s. per 496 lb.; English, 31s. to 32s. per 504 lb.; Australian, 31s. to 31s. 9d. per 480 lb. = 4s. 6d. to 4s. 7d. per bushel.

FLOUR.—25s. to 31s. per 280 lb.

MALTING BARLEY.—27s. to 29s. per 448 lb.; grinding, 21s. to 24s. per 416 lb.

OATS.—New Zealand, 20s. to 22s. per 384 lb.

SPLIT PEAS.—39s. to 40s. per 504 lb.

GINGER.—Jamaica, 52s. to 60s.; Cochin, 65s. to 70s.; Japan, 24s. to 25s. per cwt.

VANILLA.—3s. to 7s. per lb.

PEPPER.—Capsicums, 14s. to 65s.; chillies, 53s. to 56s. per cwt.; black, 6d. to $6\frac{1}{2}$ d.; white, $9\frac{3}{4}$ d. to $9\frac{1}{2}$ d. per lb.

GREEN FRUIT.—American apples, 18s. to 25s.; Tasmanian (no quotation); bananas, 8s. to 14s. per bunch; pineapples, 3s. to 6s. each; oranges, Valencia, per 420, common, 6s. to 7s. 6d.; medium, 9s. to 12s.; fine selected, 14s. to 20s.; finest selected, 22s. to 31s.; lemons, Messina, finest selected, per 360, 22s. to 24s.; ordinary to fine, 7s. to 13s.

DATES.—Tafilat, 75s. to 80s. per cwt.; Persian, 7s. 6d. to 10s. per case; Egyptian, 11s. to 15s. per cwt.

COTTON.—Uplands, 8d.; Sea Island, 13d. to 1s. 9d. per lb.

COTTON SEED.—£6 4s. to £6 7s. 6d. per ton.

COTTON-SEED OIL.—Crude, £17 15s.; refined, £19 10s. to £20 10s.

COTTON-SEED OIL CAKE.—£4 12s. 6d. (undecorticated) to £6 17s. 6d. (decorticated) per ton.

LINSEED.—53s. to 57s. per 416 lb.

LINSEED OIL.—£16 6s. 8d. to £17 per ton.

LINSEED OIL CAKE.—£6 15s. to £7 per ton.

OLIVE OIL.—£31 10s. to £32 per tun (252 gallons).

COPRA (cocoanut-kernel).—£14 15s. to £15 per ton; £8 to £9 per ton at the S. S. Island trading stations. Corresponding value in Queensland, £10 to £12 per ton.

COCOANUT OIL.—£26 to £30 per ton.

BEEWAX.—Australian is scarce and worth £6 15s. to £7 per cwt.

LUCERNE SEED.—56s. to 65s. per cwt.

CANARY SEED.—67s. to 70s. per quarter of 480 lb. = 8s. $4\frac{1}{2}$ d. to 8s. 9d. per bushel.

MANILLA HEMP.—£25 to £30 per ton.

SISAL HEMP.—£35 per ton. Latest quotation in the Melbourne market, £30 to £35 per ton for Queensland-grown Sisal, hand-cleaned.

NEW ZEALAND HEMP.—£31 per ton.

FLAX.—£48 to £52 per ton.

TAPIOCA (duty, 5d. per cwt.).— $2\frac{3}{4}$ d. to 5d. per lb.

FROZEN MEAT.—The following are the Frozen Meat Trade Association's Smithfield market quotations for the undermentioned classes of frozen meat, based on actual sales of not less than 100 carcasses of mutton or lamb

of fair average quality. These quotations are not for selected lines, but for parcels fairly representative of the bulk of the shipments now on the market:—

New Zealand Sheep.

(Crossbred Wethers and Maiden Ewes.)

	Mar. 12.	Mar. 19.
Canterbury, light (48 lb. to 56 lb.)	4½d.	4½d.
Canterbury, medium (56 lb. to 64 lb.)	4½d.	4½d.
Canterbury, heavy (64 lb. to 72 lb.)	4¾d.	4¾d.
Dunedin and Southland (56 lb. to 64 lb.)	4¾d.	4¾d.
North Island (55 lb. to 65 lb.), ordinary	4¾d.	4¾d.
North Island, best	4¾d.	4¾d.

Australian Sheep.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	3¾d.	3¾d.
Light (under 50 lb.)	3¾d.	3¾d.

River Plate Sheep.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	3½d.	3½d.
Light (under 50 lb.)	3½d.	3½d.

New Zealand Lambs.

Canterbury, light (28 lb. to 36 lb.), new season's	5½d.	5½d.
Canterbury, heavy (36 lb. to 42 lb.), new season's	5½d.	5½d.
Dunedin and Southland (28 lb. to 42 lb.)	None offering.	
North Island (28 lb. to 42 lb.)	5½d.	5½d.

Australian Lambs.

30 lb. to 40 lb.	4½d.	4½d.
-------------------------	------	------

River Plate Lambs.

30 lb. to 40 lb.	4½d.	4½d.
-------------------------	------	------

New Zealand Frozen Beef.

Ox, fores (180 lb. to 220 lb.)	2¾d.	2¾d.
Ox, hinds (180 lb. to 220 lb.)	3¾d.	3¾d.

Australian Frozen Beef.

Ox, fores (160 lb. to 200 lb.)	2¾d.	2¾d.
Ox, hinds (160 lb. to 220 lb.)	2¾d.	2¾d.

River Plate Frozen Beef.

Ox, fores (160 lb. to 220 lb.)	2¾d.	2¾d.
Ox, hinds (160 lb. to 220 lb.)	2¾d.	2¾d.

(All quotations for beef are nominal.)

EGGS.—French, 10s. to 12s. 6d.; Danish, 8s. to 13s. per 120.

BACON.—Irish, 50s. to 58s.; American, 40s. to 46s.; Canadian, 44s. to 52s. per cwt.

HAMS.—Irish, 70s. to 101s.; American, 46s. to 50s. per cwt.

TALLOW.—Mutton, fine, 28s. 9d.; medium, 27s. per cwt.; beef, fine, 28s. 6d.; medium, 26s. 6d. per cwt.

GOATSKINS.—Cape, from extra light to heavy, 9d. to 15½d.; Angora, light to heavy, 5d. to 7½d.; Natal, goat and Angora, 1¾d. to 8d. per lb.

POULTRY.—(Smithfield).—Good supplies to hand, but slow demand. Fowls: Yorkshire, 3s. to 3s. 6d.; Essex, 2s. 9d. to 3s. 6d.; Boston, 2s. 6d. to 3s.; Surrey, 3s. 6d. to 4s. 6d.; Sussex, 3s. 3d. to 3s. 9d.; Welsh, 2s. 3d. to 2s. 9d.; Irish, 1s. 9d. to 2s. 3d. Turkey cocks, 8s. to 12s. 6d.; hens, 5s. to 6s. 6d.; goslings, 5s. 6d. to 6s. 6d.; country ducks, 3s. 3d. to 4s.; wild rabbits, 5d. to 9d. each; Australian, 6s. 6d. to 8s. 3d. per dozen; hares, 2s. to 3s.; leverets, 1s. 9d. to 2s. 6d.; guinea fowls, 2s. 6d. each.

General Notes.

COST OF GROWING WHEAT IN NEW SOUTH WALES.

Writing on the subject of the cost of growing wheat in New South Wales, one authority puts it down at 14s. 2d. per acre. With an average of 12 bushels per acre, and with wheat at 2s. 6d. per bushel, farmers should get a net return of 16s. per acre.

TROPICAL AGRICULTURIST (CEYLON) PRIZE ESSAYS.

Subscribers to the above journal will be aware that the proprietors have offered three handsome prizes for the best, second, and third essays summarising and embodying the information given in the T.A. volume for the period embraced between July, 1903, and June, 1904, on New Products, apart from the staple productions, such as rice, tea, coffee, cacao, cardamoms, cinnamon, the palms, sugar, and rice. The essays were to have been sent in within four weeks after the issue of the June number of the T.A. for 1904.

Thinking it possible that there may be subscribers in Queensland who may wish to compete, we wrote to the proprietors, pointing out that the time for sending the essays was too short, except for India, Ceylon, Straits Settlements, &c.

The proprietors have recognised the disability, and have very courteously extended the time to seven weeks.

In this connection, we hope to see one at least of the prizes find its way to Queensland.

THE LARGEST DAM IN THE WORLD.

Under this title, *Forestry and Irrigation* publishes an item in regard to a proposed dam that is to exceed in size the large dam on the Nile:—

"British engineers in India propose to dam the Tungrahbadra River, which flows through the Madras Province, for the purpose of irrigation, to offset dry-season conditions. The dam is to be built at Hospet, which is near the centre of the southern portion of the Indian peninsula, and will be nearly a mile long and 150 feet high. This will form a lake 40 miles long, with an area of 150 square miles, and impound 200,000,000,000 cubic feet of water. As compared to the great dam at Assuan, Egypt, it can be seen that the Tungrahbadra dam will be a quarter of a mile shorter, but about twice as high, and will impound six times the amount of water. However, if the Nile dam should be raised to the height originally planned, and for which the foundations were built, this disparity would not be so great."

DANISH BUTTER.

The Russian Minister of Trade and Commerce has made the interesting discovery that fully 50 per cent. of what is known in Great Britain as "Danish butter" in reality comes from Russia, Denmark acting merely as the agent or middleman in its transport. Since 1896, Danish exports of butter to England have risen from 3,810,000 poods to nearly 5,000,000 poods, whereas Russian direct exports to our shores have risen from 71,000 poods to about 1,200,000 poods. Consequently it is being recommended that steps should be taken so to mark Russian produce as to make its origin clear.

RUSTY NAIL WOUNDS.

One of the very best remedies that can be applied to a wound made by a rusty nail, and which is almost infallible in its cure, is to take a quantity of peach leaves, beat them to a pulp, and then apply them to the wound, and in a very short time an improvement will be noted in the wound. Several persons have tried this remedy when all others failed to give relief, and it was beneficial in its results.—*Scientific American*.

PUBLICATION RECEIVED.

We have pleasure in welcoming to the official agricultural literature of the world the *Rhodesian Agricultural Journal*, the first three numbers of which are to hand. The journal is published every alternate month, and each number contains a variety of useful and thoughtful articles on subjects of interest to the farmer, orchardist, stockbreeder, and market gardener. We note that attention is being paid to cotton-growing in Rhodesia, and shall publish some extracts in our next issue culled from our latest contemporary.

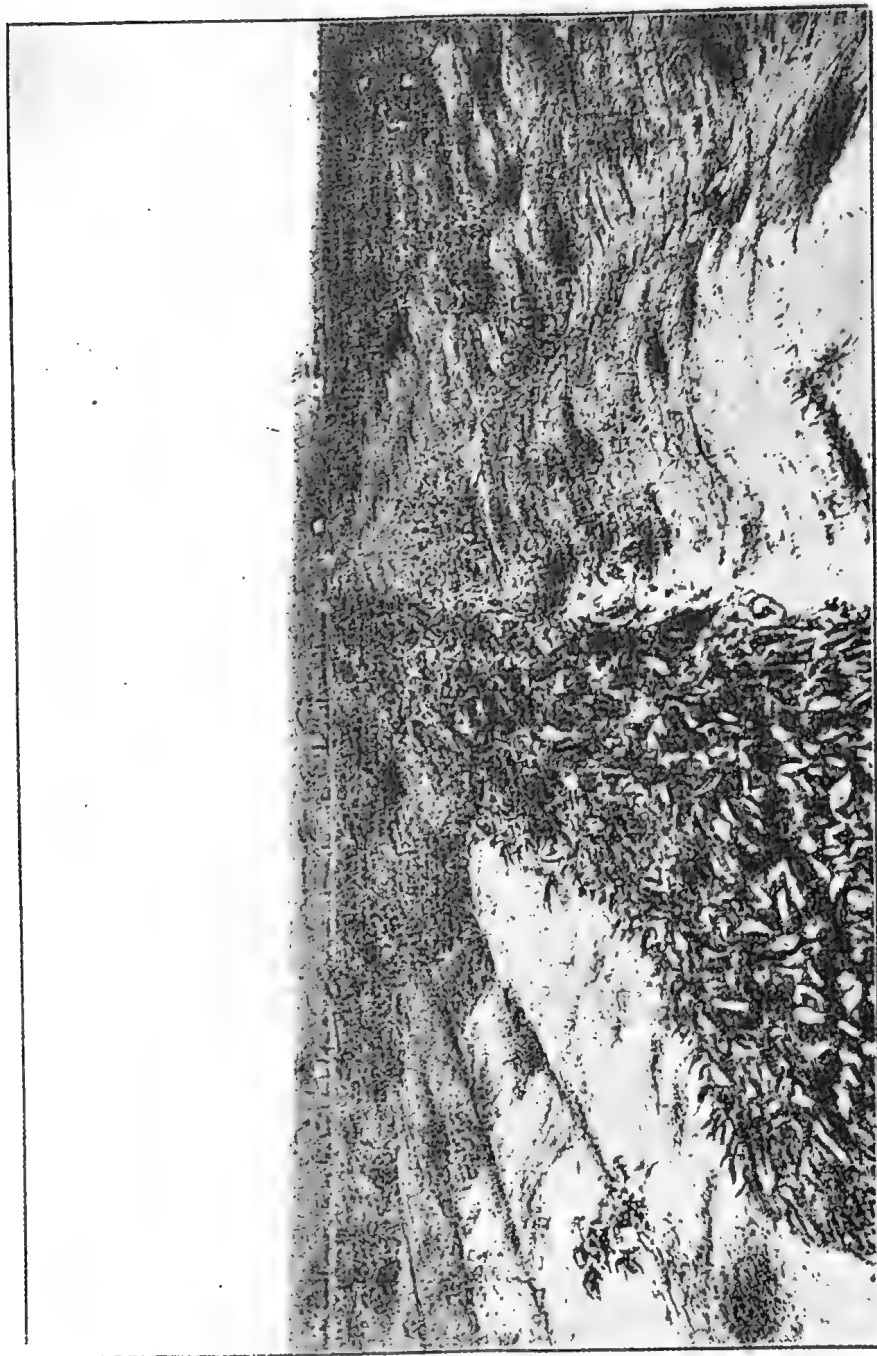
POULTRY SHOW.

The show of the Queensland Poultry Club will take place at the Exhibition Building on 24th, 25th, and 26th May.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

Plate XXI.



A ROW OF RESISTANT COTTON IN A DISEASED FIELD IN AMERICA.

Answers to Correspondents.

"WHIPPING" COTTON.

INQUIRER, Ipswich.—The object of "whipping" is to get rid of all broken seeds, bits of leaves, and broken pods. The cotton is thrown backwards and forwards (not rolled) on a large wire-netting sieve, about 3 feet long by 2 feet wide and 6 inches deep. This process leaves the cotton white and loose and ready for ginning.

Pickers, before going into the field, should be made to clearly understand that no impurities should be allowed to get into the bag with the cotton. A careless picker will gather with the seed-cotton fragments of pods, leaves, or twigs, which will have to be removed. Cotton dropped on the ground will also pick up stones, hard soil, and rubbish generally. We have known pickers to deliberately drop the cotton, and even to put stones in the bag to increase the weight. But such practices are very quickly detected. The object of carrying a bag round the neck is to allow the picker the free use of both hands for picking.

BROOKFIELD.

NEWLY ARRIVED FARMER, Brookfield.—

1. The hills now covered with *Lantana* were once covered with scrub.
2. The farmers generally produced corn, potatoes, vegetables, and engaged also in dairying. They prospered, as prices for produce were high in the old days.
3. Oranges, lemons, plums, and peaches thrive well at Brookfield; but we would not advise the planting of peaches or plums, which are now mere attractions for the fruit fly.
4. Mr. McConnell had a sugar-mill in the district, and obtained 1st prize in London for his sugar, and 1st prize in Brisbane for sugar-cane.
5. Bananas never had a fair trial at Brookfield, but they appear to do well now.
6. Goats do not touch *Lantana*.

INKWEED.

J. E. LANE, Crow's Nest.—Your question has been referred to the Agricultural Adviser, Mr. P. McLean, who states that at one time there were quantities of the pest on the Logan and Albert farms. Cattle were never known to eat it, and eventually it disappeared, and is now scarcely known in those districts. The Government Botanist, Mr. F. M. Bailey, says it cannot be called a poisonous plant, the berries having been formerly used for staining imitation port wine. The roots have been used as cathartic and emetic. It is thus unlikely to produce rickets in any animal which happens to eat the leaves or berries.

COUCH GRASS.

"LINCOLN," Chinchilla.—There is only one way of getting rid of couch grass—i.e., by cultivation. A shallow ploughing, succeeded by harrowing, will get rid of most of it. Then deeper ploughing will do the rest. By continuing this course so long as any quantity of couch appears it can be eradicated. If it should have grown, as it often does, into thick masses, run the mowing machine over it first.

DEAD WEIGHT OF PIGS.

J. BICKERS, Logan.—A well-fed, well-matured pig should run to as much as 85 per cent. carcass weight. Young pigs of 100 lb. live weight would go about 60 per cent. As to cattle, coarse, large-boned animals lose more than neat cattle. The latter, and half-fed cattle lose one-half their live weight. Lean, store cattle run about 45 lb. per 100 lb. of live weight.

FROST-PROOF POTATO.

POTATO-GROWER, Albert River.—

You ask if there is such a thing as an English potato, so-called, which will resist frost?

There is such a potato, known botanically as *Solanum Commersonii*. It is a native of Paraguay, South America. The potato has been introduced into France, where it is said to have withstood from 2 degrees to 34 degrees of frost, or 2 degrees below zero. There is, however, says the Director of Kew Gardens, a drawback to it, in that it is not yet eatable, owing to the presence of a bitter principle known as solanine. This will probably disappear by cultivation, and when that result is achieved potato-growers will no longer fear frost.

Possibly the residents of Cosme Colony, in Paraguay, could give some information about it.

GRAFTING PERSIMMONS.

W. E. L. HOLMES, Toowoomba.—Mr. A. H. Benson advises grafting in the early spring to avoid disappointment.

PEARS FROM CUTTINGS.—WARTS ON COWS' TEATS.

PEARS, Palmwoods.—

The pear cuttings will grow with root helps. (*See article on grafting by A. H. Benson, Vol. IV., p. 37.*) Mr. Benson, however, strongly advises that pears be not planted in the Palmwoods district. *They will not pay, and will breed the fruit fly wholesale.*

2. For cures for warts on cows' teats *See Vol. V., p. 511; Vol. VI., p. 9; Vol. VIII., pp. 146, 478; Vol. X., p. 483; Vol. XII., p. 116; Vol. XIII., pp. 294, 587.*

CATERPILLARS ON ORANGE-TREES.—TANGLEFOOT OR TOE.

H.N.R., Herberton.—

Mr. Henry Tryon, Entomologist and Government Pathologist, says:—Nothing is known here of the Hairy Green Caterpillar, referred to as infesting orange-trees in the Herberton district. That the information sought may be afforded, it is, therefore, necessary that specimens be placed at the disposal of the Entomologist. These should be sent in a phial containing water to which a few drops of formalin have been added, or in diluted spirits, the caterpillars being supplemented by living chrysalises, if procurable.

The term "Tanglefoot" in the connection mentioned is applied to the ordinary fly-paper (obtainable at druggists' establishments), in which the sticky substance present, as the essential feature, is composed of resin, linseed oil, and honey, or related bodies, boiled together in definite proportions.

WHITE LEGHORNS—PASPALUM.

A. S. L., Lowemead, Bundaberg—

1. White Leghorns should have bright yellow legs and pure white ear-lobes.

2. Paspalum planted on a hillside will spread to the valley. It will also overrun and probably destroy the couch grass.

The Markets.

PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	MARCH.					
	Prices.					
Apples, Eating, per packer	6s. to 6s. 6d.
Apples, Local, Cooking, per case	3s. to 4s.
Apples, Tasmanian, Cooking, per case	5s. 6d. to 6s. 6d.
Apples, American, Eating
Apples, American, Green
Lemons, Italian, per 360	14s.
Lemons, Italian, per 180	7s. 6d. to 8s.
Lemons, American, per 180	4s. 6d. to 6s.
Lemons, New South Wales, per case	4s. to 4s. 6d.
Oranges, Italian, per 180	8s. to 9s.
Oranges, American Navel, per case	15s.
Oranges, Sydney (packers)
Mandarins, Local
Mandarins, Sydney (packer)
Apricots, New South Wales, boxes (half-gincase)
Apricots, Queensland, half-case
Plums, Tasmanian, half-gincase	2s. 6d. to 3s.
Plums, Sydney, half-gincase	1s. 6d.
Peaches, half-gincase	3s. 6d. to 4s.
Nectarines, half-gincase
Gooseberries, English
Cherries
Passion Fruit, half-gincase	4s. to 4s. 6d.
Mangoes, per case
Pineapples, rough, per dozen	1s. 3d. to 1s. 6d.
Pineapples, Queen, „	2s. to 3s.
Melons
Rockmelons
Bananas, per bunch	8d. to 10d.
Bananas, Sugar, per dozen	1½d.
Tomatoes, quarter-case	1s. 3d. to 1s. 6d.
Papaw Apples, quarter-case
Custard Apples, quarter-case
Granadillas, case
Seville Oranges, apple-case
Cape Gooseberries, quart
Pears (Melbourne), export case	8s. to 9s.
Pears (Tasmanian), quarter-case	4s. to 5s.
Rosellas, per sugar-bag

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR MARCH.

Article.	MARCH.					
	Prices.					
Bacon (Pineapple)	lb. 8d.
Barley (Malting)...	bush. 2s. to 2s. 3d.
Bran	£2 12s. 6d. to £3 7s. 6d..
Butter, Factory	lb. 6d. to 8½d.
Chaff, Mixed	ton £1 11/8 to £2 12/6

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR MARCH—continued.

Article.								MARCH.
								Prices.
Chaff, Oaten	...	...	...	...	...	...	ton	£2 10s. to £4
Chaff, Lucerne	...	...	...	...	...	...	"	£1 10s. to £2 10s.
Chaff, Wheaten	...	...	...	...	...	...	"	£1 8/4 to £2 12/6
Cheese	...	...	...	...	...	...	lb.	5d. to 6d.
Flour	...	...	...	...	...	...	ton	£7 15s. to £8 10s.
Hay, Oaten	...	...	...	...	...	...	"	£5 to £5 2s. 6d.
Hay, Lucerne	...	...	...	...	...	...	"	18s. 4d. to £2 15s.
Honey	...	...	...	...	...	...	lb.	1½d. to 1¾d.
Maize	...	...	...	...	...	...	bush.	1s. 9½d. to 2s. 0½d.
Oats (Victorian)	...	...	...	...	...	...	"	2s. 6d. to 2s. 9d.
Pollard	...	...	...	...	...	...	ton	£3 5s. to £4
Potatoes	...	...	...	...	...	...	"	£2 10s. to £4
Potatoes, Sweet	...	...	...	...	...	...	"	£1 to £1 17s. 6d.
Pumpkins	...	...	...	...	...	...	"	£1 to £3
Wheat, Milling	...	...	...	...	...	...	bush.	2s. 10d. to 3s. 4d.
Wheat, Chick	...	...	...	...	...	...	"	2s. 6d. to 3s.
Onions	...	...	...	...	...	...	ton	£2 10s. to £5
Hams	...	...	...	...	...	...	lb.	11d. to 1s. 1d.
Eggs	...	...	...	...	...	...	doz.	9½d. to 1s. 3¼d.
Fowls	...	...	...	...	...	...	pair	1s. 9d. to 4s.
Geese	...	...	...	...	...	...	"	4s. 3d. to 5s. 6d.
Ducks, English	...	...	...	...	...	...	"	2s. 3d. to 3s. 6d.
Ducks, Muscovy	...	...	...	...	...	...	"	3s. 1d. to 4s. 11d.
Turkeys, Hens	...	...	...	...	...	...	"	5s. 1d. to 7s. 3d.
Turkeys, Gobblers	...	...	...	...	...	...	"	9s. 9d. to 14s. 6d.

ENOGGERA SALES.

Article.								FEBRUARY.
								Prices.
Bullocks	...	...	...	...	...	...	...	£7 17s. 6d. to £9 10s.
Cows	...	...	...	...	...	...	...	£5 10s to £7 15s.
Wethers, Merino	...	...	...	...	...	...	...	£1 0s. 9d.
Ewes, Merino	...	...	...	...	...	...	...
Wethers, C.B.	...	...	...	...	...	...	...	£1 2s. 9d.
Ewes, C.B.	...	...	...	...	...	...	...
Lambs	...	...	...	...	...	...	...	16s.
Calves	...	...	...	...	...	...	...
Pigs	...	...	...	...	...	...	...

Orchard Notes for April.

By ALBERT H. BENSON.

The Orchard Notes for March dealt largely with citrus fruits, especial attention being drawn to the importance of taking every precaution, now that the fruit is reaching maturity, for preventing its destruction by the various pests that attack the ripening fruit. At the same time, I pointed out the necessity for the proper handling, sweating, and packing of the fruits, in order that it shall be placed on the markets either of this or the other Australian States in the most attractive manner and best possible condition. All that I stated in last month's Notes applies with equal force to the present month, and in fact as long as the citrus season continues, so that I need not repeat what I then wrote, but will simply draw the attention of all citrus-growers to the importance of my remarks, as it is useless to take every care throughout the year to keep the trees well pruned and free from disease and the orchard in a high state of cultivation if we do not do our best to protect the result of such work and to market it to the best advantage.

With the exception of the marketing of citrus and a few other fruits—such as persimmons, pines, bananas, custard apples, &c.—April is a somewhat slack time for fruit-growers, especially those who depend on deciduous fruits, so that the opportunity should be taken to clean up the orchard before winter, and to finish up any odd jobs that have been neglected during the previous months. Such work will consist of looking after all fences, drains, headlands, &c.; the casting back of soil round trees where same has been washed away by the heavy summer rains; the ploughing in of all weeds and trash that have accumulated in the orchard during the wet season; the removal of all dead or worthless varieties of trees that it is desirable to get rid of; and any other work—such as the collection of material for and making of compost heaps—that may be necessary.

Cyaniding for all kinds of scale insects may be continued during the month, taking care not to treat any trees bearing fruit when same is either wet with rain or heavy with dew, as, if treated under these conditions, the fruit is apt to be marked.

Strawberry-planting can be continued during the month, but the planting of all kinds of fruit trees should be delayed till the wood has been thoroughly matured. Keep the nursery clean, see that all young buds are growing properly, and that all unnecessary shoots are removed; the young tree being trained to one straight stem till high enough to form the future head of tree, when it should be topped.

Farm and Garden Notes for May.

FIELD.—The principal work in the field this month will be the sowing of wheat, barley, oats, rye, and vetches. If sowings have not been already made, there is no time to lose. See that all potatoes are killed up. Cut tobacco. Those who have cotton growing should be picking the last of the crop. Strip the bushes daily after the dew has evaporated, and spread out the cotton to thoroughly dry in the sun before bagging. Prepare for the winter feeding of stock by utilising all kinds of green stuff, either in the silo or in the stack. Every agriculturist who has a dairy herd should aim at laying down permanent grasses suitable to the climate and to the district in which he lives. A few acres of artificial grass will support a surprisingly large number of cattle in proportion to acreage. A farmer at Barcaldine fattens 12 sheep to the acre on couch grass. Coffee-picking should now be in full swing. The berries should be pulped as they are picked. Strawberries may now be transplanted. Trollope's Victoria, Marguerite, Hautbois, Auric, and Pink's Prolific are good varieties. The Auric is the earliest, and the Marguerite next. In some localities, strawberry-planting is finished in March, and the plants begin to bear the first week in August.

KITCHEN GARDEN.—Onions which have been grown in seed-beds may now be transplanted. The ground should have been thoroughly cleaned, pulverised, and rolled beforehand. Onions may still be sown in the open, on thoroughly clean ground. In favourable weather, plant out cabbages, cauliflowers, lettuce, leeks, beetroot, &c. Sowings may also be made of all these in addition to peas, broad beans, kohlrabi, radishes, spinach, turnips, parsnips, and carrots. Dig and prepare beds for asparagus. Choose the best soil, which is a deep, sandy loam, dug 18 inches deep and well manured, a good sprinkling of salt being added a month before the planting season. Then peg out the beds 4 feet wide, leaving a path 2 feet wide on each side of the bed. Plant 4 rows in each bed, the front rows 9 inches from the side; cover the crowns at least 3 inches with good loose soil and manure mixed; rake to a smooth surface. The plants must be 15 inches apart. For old beds, cut the stalks down in May; dig the beds lightly over with a fork, and lay over them a good dressing of manure. In September you may begin to cut. You may ensure the blanching of the tender shoots by placing earthen pipes or bamboo joints over them.

FLOWER GARDEN.—During showery weather, planting and transplanting may be done at once, as the plants will be established before the frosts set in. Camellias and gardenias may be safely transplanted, also such soft-wooded plants as verbenas, petunias, penstemons, &c. Cut back and prune all trees and shrubs ready for digging. Dahlia roots should be taken up and placed in a shady place out of doors. Plant bulbs, such as anemones, ranunculus, snowflakes, freesias, ixias, iris, narcissus, &c. Tulips and hyacinths may be tried, but success in this climate is very doubtful. All shades and screens may now be removed, to enable the plants to get the full benefit of the air. Fork in the mulching, and keep the walks free from weeds. Clip hedges and edgings.

[EXTRACT.]

SISAL HEMP.

The sisal hemp of commerce is a product of one of the *Agave* family, belonging to the natural order *Amaryllidæ*. There are several species, and all were originally natives of Central America, and chiefly of Mexico, whence the name sisal grass of Mexico. They are now, however, widely acclimatised in most warm, temperate, or sub-tropical and tropical countries. They take several years to reach the flowering stage, and from the fact that in adverse circumstances their development may be retarded from 10 to 50, even to 100 years, they are popularly called the "Century Plants."

VARIETIES.

There are, as stated, several varieties of the sisal hemp plant (*Agave rigida*), but the three chief ones from which the sisal hemp of commerce is extracted are:—

- (1) *Agave rigida*, var. *elongata*, of a greyish-green colour, with thorny spines on the edges of the leaves.
- (2) *Agave rigida*, var. *sisalana*, of a dark-green colour, having no spines on the edges of the leaves, the absence of which facilitates handling.
- (3) *Agave Heteracantha*, known as "Ixtl" in Mexico, is largely used in the manufacture of nail and scrubbing brushes, for which purpose a very great demand exists for the fibre. It is also used in the manufacture of corsets and of artificial flowers.

In the Mauritius, the plant furnishing what is known commercially as Mauritius hemp is the *Fourcroya gigantea*, or, popularly, the Green Aloe. This plant is, erroneously, supposed to be an *Agave*. It belongs, however, to the same natural order as the *Agave*—viz., *Amaryllidæ*.

This *Fourcroya* is found in all parts of the coast lands of Queensland, and wherever it has been introduced it has thriven as well as in its native Yucatan. Although not as valuable a fibre plant as the *Agave sisalana*, it is nevertheless of considerable commercial value, and in districts where the plant is acclimatised it seems folly not to utilise it. The plant grows like a weed. It is almost as hard to kill as the prickly pear, and it produces a mass of fibre which can be sold in any quantities in the home markets for £30 per ton.

Of the seven varieties of the *Agave* plant cultivated in Yucatan, the best is that known as "Sacqui"—meaning white in the Indian dialect, owing to the light-green colour of its leaves. This variety possesses all the best attributes of a fibre plant—viz., abundance, flexibility, whiteness, strength, length, and weight. The leaves of all the varieties vary in size, from 5 to 7½ feet in length by from 4 to 7 inches in width. The plant has many names in Yucatan, such as "Henequin" in Spanish and "Sacqui" in Indian. Doctor Perrino, who introduced it into Florida, gave it the name of *Agave sisalana*. In Cuba it is known as the "maguey."

SOIL.

There is no known plant which will thrive so well and yield such large returns on poor, impoverished-looking, dry, rocky soils as the sisal hemp plant. Except on absolutely barren sands, it will thrive in any kind of soil, the sole condition being that the latter be dry or thoroughly well drained. It is waste of labour to plant it on wet soils. On rich agricultural land it will thrive most luxuriantly, but the fibre will be inferior to and less in quantity than that from plants grown on poorer, arid land. There are hundreds of acres in the neighbourhood of Brisbane alone which would yield rich returns if planted with sisal hemp instead of being overrun with wattles and lantana. The writer a

couple of years ago tried, in conjunction with a prominent resident of Coorparoo, South Brisbane, to introduce the cultivation of the plant into that district, but was met with the usual incredulity and apathy. No one could be induced to believe that those wretched gravelly soils would grow anything but stunted gum-trees and wattles. The result is that, where owners of such property could now have been getting good returns from their unused lands, they are paying more than they are otherwise worth in rates and taxes.

PREPARATION OF THE LAND.

The land requires no preparation whatever prior to planting. No ploughing or harrowing is needed. The land should be laid out in blocks, with roads between for the passage of drays when harvesting. Holes are dug in rows 11 feet apart, and from 6 to 7 feet apart in the rows. This will give 650 plants to the acre.

PLANTING.

The Agave may be propagated from seed or from suckers. Suckers should be preferred, as the returns are obtained a year or two earlier than when the plants are raised from seed. In removing young plants from the nursery, and before planting them out, the roots must be cut off right up to the stem, and any dry leaves pulled off, exactly in the same manner as pineapple suckers are treated for planting out. The young plants must be planted perfectly upright, for if put in slantwise they grow out across the rows, and there is no getting between them to gather the leaves which ripen first.

CULTIVATION.

Once the plants are put in they may be practically left to themselves. Should weeds be troublesome in the early stages of growth, these may be hoed down, but soon the plants require no attention. The simplicity of the cultivation may be conceived from the statement by a writer who had been in the business in Central America, that there is not a hoe or spade, harrow or plough, employed in its cultivation in all Yucatan. When the plants are from three to four years old, any stock, even goats, may be turned in to keep the weeds down. They will have nothing to say to the Agave with its pointed spear. Whilst the plants are still young, however, they should be protected from stock, not from any fear that they will be eaten, but to prevent their being knocked out or trampled down.

HARVESTING.

The Agave will yield full returns in four or five years, but harvesting may be begun in three years after planting. The ripened lower leaves are cut off, and every four months the same operation may be repeated. When the leaves are ready for cutting they incline downwards to a horizontal position, and become darker in colour. Care must be taken to cut the leaves from the bottom upwards, and to cut close to the stem. If the *Agave rigida*, the variety having spines on the edge of the leaf, is being harvested, the spines must be trimmed off each leaf to facilitate handling. The leaves are usually tied in bundles of 25 or 50, point to butt alternately, and carried to the headland, when the drays take them up. One man can cut and tie up 1,200 leaves per day on an average. The knife used for cutting is an ordinary sheath knife with an 8-inch blade.

LIFE AND YIELD.

The life of the Agave plant is a comparatively long one, but this long life may be shortened by careless or injudicious management. If the plant is allowed to send up a pole, it is ruined for fibre production. The pole on which the flowers and seeds are borne will run up to a height of 30 or 40 feet. Regular cutting of the leaves retards the production of the flower pole, and will prolong the life of the plant to fifteen years and more. About every two years numerous shoots spring from the roots, and these may be either used to form fresh plantations or may be destroyed. When the Agave has completed its

fifteenth year, it may be cut down, but one of its root shoots must be left to take its place. Thus, the original area planted will never require to be replanted, whilst large numbers of young plants are produced to form new plantations.

Now as to the yield. I will place before the reader the statement of Mr. Quennel, published in the *Journal of the Jamaica Agricultural Society* about four years ago. Mr. Quennel says:—I take for planting 5 rows in 36 feet—that is to say, 4 at 6-feet distance, and 1 at 12. I put the plants 6 feet apart in the rows. This gives me more than 1,000 plants to the acre. (It will be observed that Mr. Quennel allows for much closer planting than I have allowed for.) Each plant, at four years, gives forty leaves a year of a weight of 50 lb., of which 4 per cent. turns into fibre, dried and white, or 2 lb. of fibre to a plant, or 2,000 lb. to an acre. The fibre plant gives a hemp of a value of £30 a ton in London, which Mr. Quennel reduces to £14 a ton, after allowing for all possible expenses, including cultivation and packing. £14 a ton is more than 3 cents ($1\frac{1}{2}$ d.) per lb. He allows only $2\frac{1}{2}$ cents ($1\frac{1}{4}$ d.) per lb. to make 50 dollars (£10) an acre. Thus, an acre producing a net profit of £10 yields double the results of 200 cacao-trees on an acre, at 10 bags per 1,000 trees at 12 dollars (£2 8s. 4d.) net, when the London price is 65s. It is a great deal more than 20 tons of sugar-cane to an acre at 9s. per ton (from which all expenses have to be deducted).

I will take another authority quoted by Mr. P. McLean, Agricultural Adviser, in his article on sisal hemp in this *Journal*. He says:—Each robust plant is capable of yielding from 25 up to 100 leaves per annum. Hence, 1 acre containing 600 plants will produce from 15,000 to 60,000 leaves per annum. The average yield of dry fibre from 100 leaves is 4 lb.; therefore, 1 acre will yield from 600 lb. to 1 ton of fibre. Frequently $1\frac{1}{2}$ tons per acre have been realised, and with the latest improved machinery from 2 tons to $2\frac{1}{2}$ tons per acre may be realised. The working expenses have been usually averaged at about 30 per cent. of the value of the fibre produced per acre. Therefore, taking an average yield of 1 ton of fibre at, say, £40, and from this deducting 50 per cent. for working expenses, it will be seen that the net profit is £20 per acre. (The value of sisal hemp at present in the London market is £32 per ton.) In a pamphlet on sisal hemp, Mr. D. J. Stoddart says: "Many farmers' annual incomes are from £100 to £400 from sisal hemp," planted in out-of-the-way places on the farms.

The usual price of sisal hemp is £40 per ton, and the price is regulated by that of Manila hemp, which has lately been very high. In 1902 some sisal fibre, grown at St. Helena Penal Establishment, was sent to Melbourne, and was reported on by Messrs. James Miller and Co., rope and twine manufacturers. The report stated that it was "of very superior quality, and worth about £35 per ton."* Now, if we put the value of hemp grown in Queensland at £35 per ton, and deduct as much as 50 per cent. for working expenses, there still remains a profit to the grower of from £17 10s. to £26 5s. per acre.

EXTRACTION OF THE FIBRE.

Notwithstanding the constant advocacy of the industry, both by official and private agricultural and other journals, farmers have hesitated to plant owing to the fear that expensive machinery is required. This is quite a mistake. There are expensive machines, costing, with boiler and steam-engine, up to £1,200, turning out three-quarters of a ton of fibre per day. But there are other machines, called "Raspadors," universally used in all countries where agave hemp is grown, and which are kept on large estates even, in the event of any breakdown of the big machinery. A raspador can be bought as low as £30, and such a machine will turn out 333 lb. of clean dry fibre in ten hours. Raspadors have been greatly improved upon. In Yucatan and Mexico, Death and Ellwood's machine and the "Kennedy" are much in use, the former being as nearly perfect as possible. One of these is sufficient to work off 100 acres

of leaves annually. In Mauritius, a machine called the "Gratte" is used. Both the names of the machines signify "raspers" or "scratchers." The "Raspador" consists of a large-toothed wheel which scrapes the pulp away and leaves the fibre. The following table will show the kinds of machines in actual use in Yucatan:—

Machine.	Number of Leaves cleaned in 10 hours.	Actual Horse-power.	Number of Men needed.	Cost of Machine.		English Money in round numbers.	Number in use.
				Mexican.	United States.		
				†Dollars.	Dollars.	£	
Lanaux	130,000	35	3	6,000	2,856	571	6
Prieto	125,000	60	3	7,000	3,332	664	90
Stephens	150,000	70	3	11,000	5,236	1,047	6
Solis (Raspador)	9,000	6	2	250	119	24	1,200
Torroella	80,000	30	3	5,000	2,380	476	20
Villamor.	70,000	35	3	6,000	2,856	571	?

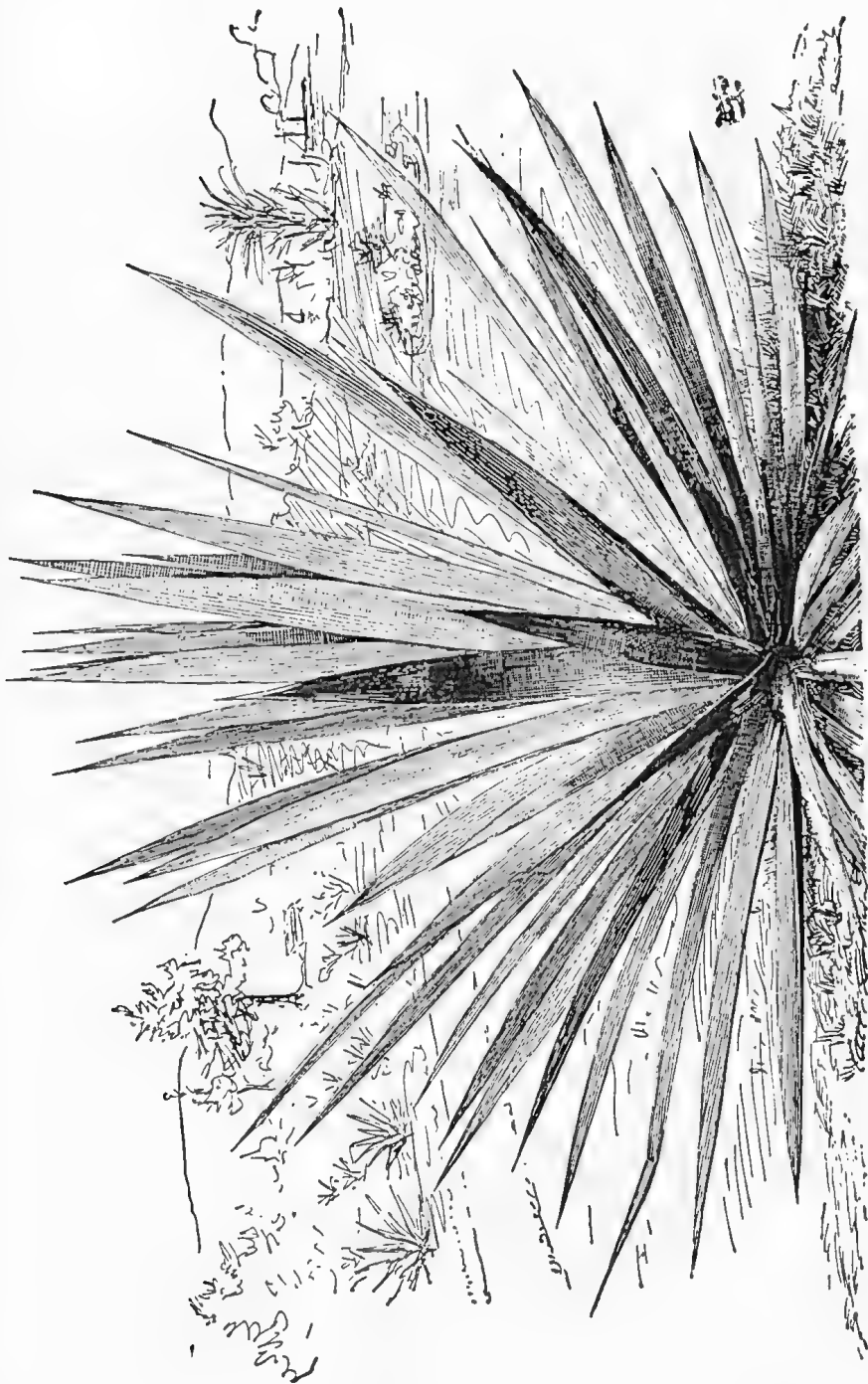
* A sample of Sisal Hemp prepared at St. Helena was sent in February last to Melbourne to be reported upon by experts in fibres for rope-making.—Ed. Q.A.J.

† Average value of the Mexican dollar, about 1s. 11½d.

The cost of production is a little less than 1d. per lb. For convenience I will take the Mexican dollar at 2s., which would bring the cost of the Raspador to £25.

The Death and Ellwood machine, to deal with 100 acres, costs about £24. The "Marabal" and the "Kennedy" are similar machines. All can be driven by steam or water power, and the cost of production of clean fibre may be set down at a little less than 1d. per lb. in Mexico.

Plate XVIII.



Fourcroya gigantea.

Subscription price, Five Dollars per Annum in Advance. Single Copies, Fifteen Cents. Payment in Advance. Subscriptions outside the United States, Six Dollars per Annum. Entered as Second-Class Matter, October 3, 1917. Postpaid. Accepted for mailing at special rate of postage provided for in Act of October 3, 1917. Authorized Second-Class Mail Matter.

Vol. 61, No. 1

1918

1918

1918

1918

1918

1918

Agriculture.

PLOUGHS AND PLOUGHING.

From a series of articles in the *Agricultural Gazette* of Tasmania, by Primrose McConnell, B.Sc., we take the following:—

THE SKIM-COULTER.

An important and indispensable adjunct of all ploughs is the skim-coulter; so indispensable that the writer does not believe that any satisfactory work can ever be done without it. Many champion ploughmen of the old school could, by adjusting the "rake" or set of the ordinary coulter, so turn a furrow-slice over that the grass was completely covered out of sight, sometimes using a dragging chain trailing from the coulter over the edge of the furrow-slice as it slipped past; but the liability of this to grow green in the "seams" before seed-time—especially during a mild winter—was great, and it is a mistake nowadays not to use the arrangements specially designed to obviate this defect, especially when the ploughmen are not of the best quality. In the digging plough, and even in the common chilled steel short-breasted ones, the skim-coulter is a very large feature indeed; and a large slice of soil (sometimes the greater part of the surface of the furrow-slice carrying the surface rubbish with it) is pared off and turned over into the bottom of the furrow. By this means there is less soil to be moved by the breast, while the complete burial of all grass, stubble, weeds, &c., conduces very much to keeping the land clean and to making a tilthy seed-bed. The writer once had some land ploughed with skins on the ploughs, and part of the same field (stubble land) ploughed without skins; the skimmed land showed up clean and bare after harvest, the unskimmed was so foul that it required to be immediately bare-fallowed.

It is a curious fact that the draught of the plough is not altered in the least by the presence or absence of a coulter. Its use is simply to cut the edge a little more cleanly than the front edge of the mouldboard would do, and it is almost unnecessary where a skim-coulter is in use. Indeed, in many of the American forms used on the prairies for ploughing the clean, loose, stubble soil, no coulter of any kind is used at all, the cutting edge of the breast being quite effective; but still, on some of our stiffer soils here, it is useful in giving a shape to the slice and a guide to the body of the plough. On such soils, if none is used, or if it is improperly set, the plough does not run so true or so steadily. Still, the fact remains that on most soils where a good slice is pared off the edge by the skim-coulter there is no need at all for the knife-coulter, especially on stubble land.

The disc or wheel coulter has not been a universal success for several reasons. It, of course, runs with less friction through the soil than does a knife or skim coulter; it does not gather any weed or dung rubbish on its edge as it runs along, and is therefore valuable for ploughing in surface dressings; but, on the other hand, it will not work on stony land, while it cannot be set so accurately as the knife-coulter—a matter of extreme importance in the case of swing-ploughs, where the least change in the set of the irons makes all the difference between easy, good work and the reverse. In a homogeneous soil, however, and with a wheel plough, these drawbacks disappear, but still the wheel-coulter can never take the place for efficiency of work of the skim. A new style of disc-coulter is now becoming common in America—viz., one fitted to run on a swivel like a castor-wheel. The improvement consists in the fact that the setting of the coulter does not need to be so nice; it adjusts itself to the running of the plough instead of guiding it.

SPRING BRIDLE.

There is another little improvement which is quite common on transatlantic ploughs, but which we have never seen on one made at home, and that is the use of a spring clevis or bridle. This is, of course, simply a spring arrangement coming between the draught chain and the beam of the plough, whereby any shock or jerkiness from stony land or other cause is absorbed and the horses do not feel it. We are accustomed to see such an arrangement on some of our mowing machines, and it is a matter of surprise why an attachment of this sort is not more commonly in use. There were spring draught-chains—two to each horse—brought out by somebody at one time, but the most suitable and convenient arrangement would be a single spiral spring fastened on to the central draught-hook of the wey-tree of a set of whipple-trees, so that the one arrangement could be applied to all implements pulled by a couple of horses walking abreast.

THE NEW STYLE OF PLOUGHING.

In recent years from across the Atlantic have come new ideas as to the objects of ploughing. The old idea was to cut and turn over a furrow-slice where the width was to the depth as 10 to 7 (10 inches by 7 inches where the land allowed of this size, or in the same ratio), as this proportion mathematically and in practice was found to give a slice which would turn over and lie accurately at an angle of 45 degrees on both faces, where the section of the slice was rectangular. The new idea is now to "cultivate" the land as much as possible concurrently with the act of ploughing, and, consequently, the relation of the width to the depth is no longer a matter of importance if the work is left in a proper state and is done at a sufficiently quick rate. We therefore now, in the majority of cases—at least, where farmers are up to date in their methods—turn a furrow which is broken and pulverised in the act of ploughing as much as possible, which is wide in proportion to its depth, and which has the surface rubbish completely buried underneath, and all this in place of the old style of having the furrow-slices squeezed and pasted up close to each other like so many bars of soap.

If the mouldboard of one of these new ploughs be compared with the old, it will be seen that the principal difference is in the comparative lengths of the two and the angle at which they are set. The new pulverising plough has a short, wide-set wrest, which cracks and crushes up the soil as it goes along, inverts the top rubbish, and spreads the loose soil, thus making either a capital seed-bed straight away or else leaving the top rough and broken for the winter frosts to act on. The particular curve of the breasts also will be found to differ from the old forms. These latter have a tendency to be more convex on the earth side, but the new chilled steel ones are decidedly concave in their curve, and it is partly to the concavity that the pulverising action is due.

It must be acknowledged, of course, that for neat work on a piece of tough old turf or on a stiff clay soil, many of the "cultivator" forms of the modern plough are not suitable, excepting with a good cutting skim-coulter; but for work which is calculated to "turn up the virgin soil which never saw the sun," for burying grass or other surface growth, for breaking up the furrow-slice, these new varieties are desirable.

As pointed out above, however, the benefits which accrue from the use of these modern ploughs, it must be acknowledged, are not so apparent on clay soil, as the pulverising action does not act so well as on loamy or other free working soils. It is just on clay soils, however, that it is most needed, and the plough which will even only break up the slice into lumps without pulverising it is an advance. On such soils any plough of the swing variety is held with very great difficulty, and it is in a case of this kind particularly that the benefits which accrue from the use of wheels show up; a first-rate ploughman is helped very much, while a second-rate man is put on a par with him as far as the total and resultant effects of the work are concerned.

THE NEW VARIETIES OF POTATOES.

That a fall in the enormous prices lately obtained for new sorts of potatoes will take place in a comparatively short time is not to be doubted. At the outset, of course, people will pay almost any price for them, but, in the nature of things, such prices cannot stand. Once sufficient are being grown to place them on the household market, high prices—or, at least, abnormally high prices—will not be obtainable. For instance, Northern Star, at present worth £500 per ton, will ere long be only worth £20 per ton, and will then fall possibly to £8, whilst Eldorado and Sir John Franklin, worth anything up to £400,000 per ton, will also fall as production increases, until within three years the potato boom will have passed, like the Dutch tulip craze, but, unlike the latter, it will leave the United Kingdom farmers in a better position financially than before these new kinds were discovered, because a high-cropping, disease-proof potato will have taken the place of the old diseased stock over 2,000,000 acres devoted to the indispensable potato in the old country. We learn that one grower in England hopes to have 200 acres of one of the new sorts. The yield of such has been placed at 23 tons per acre. Putting the yield at 20 tons, this grower will have 4,000 tons for sale, besides many tons for seed purposes. To purchase this crop at prices actually now paid for such a variety would require a capital of one billion six hundred million pounds sterling! (£1,600,000,000). When this crop of 200 acres is harvested next year, it will be highly interesting to know where and how the grower will have unloaded this mine of wealth, and how much he will have realised by it.

It is not the original producer, as we have already pointed out, who coins money at this new potato business. The time, money, and anxious care bestowed upon thousands of experiments are only compensated for by the honour of having done a great work for the potato-growing world—the cash returns are small in comparison. It is the second man, not the pioneer, who comes in for the profit. An English journal, on this head, remarks:—"Those precious sorts of potatoes which are now being sold at 1s. a lb., or £112 per ton, are usually propagated with great care. They are carefully grown and sprouted in a dry sunny window, and the setts are cut so as to preserve every eye for a separate plant. They are carefully sheltered from frost, and raised under glass, or are protected from frost with the utmost care. One shilling a pound really seems to be a very heavy cost for seed, and certainly when acres are planted the cost of cultivation must exceed—nay, must transcend—any estimates. We have, however, reached a period when £1 per lb. is quite cheap for some of the cracks, and I have even heard of £200 a lb. Some of these sorts are not to be bought for love or money, and buyers are obliged to be content with purchasing forward from the coming growth. As to the soundness of these extraordinary values, it may be pardonable to express some doubt; and a great fall as soon as the new crops are on the market is almost certain. There is a goodly array of these candidates for favour, all of which cannot hope to maintain the prices now demanded. Certainly this great interest in new varieties of potatoes is highly interesting, and not very easy to explain, for, after all, they are only potatoes."

We have now some small parcels of the new kinds in Queensland, and these will most assuredly not be placed on the market next season, but will be retained for seed. Three seasons hence the importers and growers need not look for very high prices, for, as the above journal says, "they are only potatoes after all." Still, if 20 tons can be obtained where now only from 4 to 8 tons are the usual yield per acre, much good will have been accomplished.

Since the publication in this *Journal* of the enormous prices obtained for new varieties of potatoes in England, we have frequently been asked what the reason can be for farmers paying such prices for seed potatoes? Why are new varieties wanted? The answer to this is, that the potato loses its vitality and becomes subject to many diseases after having been cultivated for about nine years. In some cases it preserves its good qualities up to twelve and

fifteen years, but this is rare. The limit of the potato's vigorous life may be set down at from seven to nine years. After that, if the farmer wants good crops, he must get some new variety or give up potato-growing. Already we have found out, here in Queensland, that some varieties of the potato which have been cultivated for years have begun to yield less and less, and in many cases which we have seen, have developed chronic diseases. A change is needed, but we have no great enthusiasts in this country who devote their whole lives to the evolution of new varieties of the potato. The subject of developing such has been brought more prominently than ever before the British public. Hundreds of new varieties have been brought out, but have all been found wanting in some particular, until two years ago a Mr. Harris brought out the finest First Early ever produced, under the name of the Sir John Llewellyn. The oldest experts in potatoes in England assert that nothing they have ever seen can approach this new variety. No disease appears to affect it; its cropping powers are enormous; the quality is perfection; and it is the earliest to ripen. The production of this variety is considered to be of national importance, as the yield has been proved to reach 23 tons per acre. In 1903 the main crop on a farm at Swansea, South Wales, was sold at £40 per ton.*

Another potato-grower, Mr. Findlay, evolved a magnificent variety—the Northern Star—which sold at the rate of £3,000 per ton, and latterly at £300 per ton. This gentleman also brought out a still more wonderful potato—the Eldorado—which at present is being sold at the rate of £336,000 per ton, and £70 was offered him for one single potato, which offer he refused, only to have the tuber stolen.

Another new variety has been produced, named the Sir John Franklin. It has already been sold at the rate of £3,000 per ton.

It would naturally be supposed that the growers who experiment and finally produce potatoes saleable at such high prices are making rapid fortunes, but such is not the case. Thousands of new breeds are produced by them every year, out of which only one, perhaps not one, proves of great value. It is so very rare that some wonderful variety turns up. Out of all those thousands brought out in, say, ten years, how many really valuable potatoes have been placed on the market? About six. "Northern Star," "Evergood," "Sir John Llewellyn," "Eldorado," and "Sir John Franklin" are the five we know most about, and most of them are only sold in small quantities, as little as 5 oz. the other day bringing £56 at auction.

It will be very interesting to see how the Northern Star and Sir John Llewellyn will do in the Queensland climate. We planted them on 17th March, and they have been twice moulded up, and are growing well. The haulms are not sturdy, but rather spindly. The potatoes, on arrival, were very shrivelled, and covered with shoots. These were carefully cut out and planted, and all grew. The potatoes were then planted separately, and threw out fresh shoots. They have been planted on two dissimilar soils. On the poorer soil they were manured, and on the richer no manure was used. Full particulars will be given in the *Journal* when the crop is lifted.

THE WHEAT HARVEST OF 1904.

At the beginning of the year we estimated the coming wheat crop to total 2,500,000 bushels, and on the 20th April the Government Statistician stated that 138,096 acres had been reaped for a return of 2,436,799 bushels, or an average of 17.65 bushels per acre.

We had fully reckoned on an average yield of at least 20 bushels per acre, and our hopes would have doubtless been exceeded but for the enormous quantity of shaken grain irrecoverably lost, estimated in some instances at from 2 to 4 bushels per acre, and the abnormal growth of straw, which in many

* Those we imported in March last cost us at the rate of £560 per ton.—Ed. *Q.A.J.*

cases attained a height of from 6 to 7 feet. Added to which, the wet weather and storms which prevailed at the commencement of the harvest had a large share in reducing the average yield of saved grain. Still it is a matter of congratulation that the general harvest has turned out so well, and that, notwithstanding the quantity of pinched grain, a fair price has been maintained for the bulk of the crop threshed up to the present. The loss of many stacks both of wheat and hay by fire, generally supposed to be caused by spontaneous combustion, should impress upon farmers the necessity of providing for the escape of heated air and gases from the stacks. All stacks should be laid on a bottom which allows the air to circulate freely under them. The middle should be kept considerably higher than the walls, as in the process of settling the middle, owing to the greater amount of pressure, sinks more than the outside. If the stack settles in such a way that the inner portion becomes lower than the outer, the butts of the sheaves on the external face will be higher than the ears; consequently whenever rain falls on them it will be conducted to the middle of the stack, instead of being at once shot to the ground. With moisture rising from below and moisture pouring in from above, the losses sustained by such careless stack-building are enormous. The warm steam permeates the whole structure, the grain is mildewed, and in many cases spontaneous combustion ensues, the stack and possibly other contiguous ones are destroyed, and often the blame is laid to incendiarism, when the farmer is himself to blame for stacking his wheat in a damp condition, or for not properly building and thatching his stack. How can these things be remedied? If wheat is worth anything to the farmer, it is worth his while to look for, find, and apply a remedy.

First of all, the stooks should be of moderate size, limited to, say, five sheaves on each side, which will allow for the play of sun and wind.

In building stacks in such a wet season as has been experienced during the harvest, the effects of damp straw may be greatly minimised by building "chimneys" in the stacks, and this is very simply done: Fill a large sack tightly with straw or chaff. Place this on the platform when the foundation of the stack is laid. Then build the sheaves round this sack. As the stack rises, draw up the sack. When the stack is finished, there will be a hole in it from top to bottom. The chimney should be carried up to the top till the last few sheaves are in position. The heated air will pass away through this chimney. For a circular stack one chimney is sufficient, but in a large oblong stack one chimney should be placed at every five yards.

Stacks, however, circular or oblong, should not be too large, especially when wheat is in bad condition. It is in the width that the danger lies, not in the height. In a bad harvest no oblong stack should be wider at the bottom than 12 feet, and then the sides should not be sprung more than is absolutely necessary to enable the drip from the eaves to fall clear of the sides. A circular wheat stack should not exceed 18 or 21 feet in diameter. In the case of barley or oats, 15 feet is quite sufficient. If stacks are built of these dimensions and are provided with chimneys, very little will be heard of stacks, sheds, and implements being burnt.

It might be thought that the building of a chimney in the centre would cause that portion of the stack to sink, but it will never do so, provided that the sheaves are kept well up in the centre and incline downwards towards the outside, that the stack be well tramped down, and the ends of the sheaves beaten in.

Ten feet is high enough for the stack from ground to eaves—8 feet is better.

As soon as the height is reached, lay one row of sheaves with the butts projecting about 3 inches to form the eave; then draw in each row slightly, so as to form a kind of pitched roof. Continue in this manner until the stack has narrowed to the width of one sheaf on the top. Then the thatch should be put on. Should rain come on before the thatching is finished, do not neglect to cover it with a tarpaulin, otherwise all your previous labour will be lost.

Now about stack pests—rats, mice, and weevils. On all sides we have news from the Downs of a plague of mice. Thousands have attacked the stacks, and have made great havoc of the grain. Then the farmers set traps, and catch perhaps a dozen or so in a night, whilst possibly a hundred dozen mouselets are born on the same night in the stack.

In the old country stacks are built on regularly prepared, permanent platforms, raised 2 or 3 feet from the ground on stone or brick pillars. Why do our Queensland farmers not do the same? It is not a very expensive business to prepare a foundation of stumps in the same way as when building a cottage. Caps on the stumps cut out of kerosene tins will effectually prevent rats and mice getting at the grain. These foundations would last for years, and would save farmers hundreds of pounds sterling. As for weevils, these can be destroyed or kept away by the expenditure of a few shillings on bisulphate of carbon. But the main things to be observed in stack-building are: The preparation of a foundation for the stack, the formation of a chimney in it, the sloping of the sheaves to the outside, firmly tramping, and careful thatching.

A stack of wheat will generally contain from 3 pecks to 1 bushel of grain per cubic yard. A stack measuring 160 cubic yards will thus contain, say, 150 to 160 bushels of grain, worth from £22 10s. to £24. Is it not worth while to go to considerable trouble to save this for the miller, instead of for the mice or the fire?

LAND AVAILABLE FOR IMMIGRANTS.

In view of the request of the Prime Minister of the Commonwealth that in order to encourage immigration the State Premiers should furnish a report on the Crown lands of each State showing the area available for settlement and the character of the land so available;—the Queensland Premier, in response, entrusted to Mr. W. G. Graham, of the Lands Department, the preparation of a report setting forth the districts in which Crown lands suitable for settlement exist, together with all useful information concerning them. Mr. Graham satisfactorily accomplished the work, and reported as follows:—

AREAS AND CHARACTER OF CROWN LAND FOR SETTLEMENT IN THE STATE OF QUEENSLAND.

The area of the State is 427,838,080 acres. For the purpose of administration it is divided into forty-nine land agents' districts, in all of the principal towns of which are Government land agents, who supply information regarding land open for selection, &c.; and also into eleven pastoral districts, in which it is estimated that there is at the present time 62,929,920 acres available for selection as under:—

Pastoral District.						Area Available for Selection. Acres.
Burnett	...	...	...	...	...	1,770,880
Burke	...	...	...	...	...	7,148,800
Darling Downs	...	...	...	...	...	11,479,680
Gregory South	...	...	...	...	...	5,711,360
Gregory North	...	...	...	...	...	4,649,440
Kennedy North	...	...	...	...	...	3,889,840
Kennedy South	...	...	...	...	...	4,495,360
Leichhardt	...	...	...	...	...	7,642,880
Maranoa	...	...	...	...	...	5,736,960
Mitchell	...	...	...	...	...	2,915,360
Warrego	...	...	...	...	...	7,479,360
Total	...	...	...	...	...	62,929,920

Notwithstanding the fact that, though a large proportion of this area is suitable for agricultural purposes, its inaccessibility to railway or other communication renders it at the present time unfit for anything but purely grazing purposes. It is estimated, however, that within a distance of 20 miles on each side of the various railway lines, and in the coastal districts in the North, there is an area available of about 7,113,453 acres, as detailed below:—

BRISBANE TO TOOWOOMBA.—*Nil.*

TOOWOOMBA TO WARWICK.—The only land available is the Glengallan Estate, comprising an area of 21,653 acres, which will shortly be opened for selection under the provisions of the Agricultural Lands Purchase Acts. Though this area will probably be alienated before it can be availed of for the purpose now under consideration, it is likely that other estates will be repurchased and made available in the locality.

IPSWICH TO DUGANDAN.—*Nil.*

IPSWICH TO ESK.—*Nil.*

BRISBANE TO TWEED HEADS.—*Nil.*

TOOWOOMBA TO CHARLEVILLE.—Until Dalby is reached, 153 miles from the coast, there is practically no Crown land. To the north-east of Dalby and extending from about 10 miles back from the railway line to the Dividing Range, there is an area of about 53,000 acres; also to the south of the line in the parishes of Daandine and Greenmount, about 7,800 acres; and between Warra and Clinchilla about 50,000 acres of more or less scrubby and prickly-pear infested country, which, when cleared, is suitable for wheat-growing and general farming. Average rainfall, about 29 inches. To the west of Clinchilla, 203 miles from the coast, and on to Miles, 231 miles from the coast, there is an area of about 220,000 acres of similar land. Average rainfall, 26 inches. In the Roma district, between Yeulba, 281 miles from the coast, to a little beyond Roma, 318 miles from the coast, there is an area of 265,000 acres, embracing open blacksoil plains, sandalwood and brigalow scrubs, and box and ironwood scrubs. The soil varies considerably, but there is a large proportion of good brown and red loamy soil. The average rainfall is about 20 inches, and the district generally is looked upon as a first-class one for wheat-growing. Around Mitchell, 372 miles from the coast, there is an area available of about 120,000 acres of more or less scrubby country, with patches of open downs, the soil is of good quality, and the average rainfall is about 22 inches. From there on to Charleville, 483 miles from the coast, where the average rainfall is 19 inches, there is a very large area of Crown land, comprising about 700,000 acres of sandalwood and brigalow scrub; soil principally brown, sandy loam, and areas of open blacksoil plains. From there to Cunnamulla, 604 miles by rail from Brisbane, and about 520 miles from the coast, and with an average rainfall of about 16 inches, there is an area of about 350,000 acres, consisting generally of fine, open blacksoil downs.

BRISBANE TO GYMPIE.—On the North Coast line from Caboolture onwards the land available is principally in small and scattered areas, except near Noosa, and on the Mary River around Kenilworth. In all, there is an area of about 245,000 acres. The country, generally speaking, is splendidly watered, mountainous, and heavily wooded, with patches of vine scrub, which, when cleared, is suitable for dairying and general farming. The average rainfall is about 48 inches.

KILKIVAN TO NANANGO.—This district is largely settled; there is, however, an area of about 96,000 acres available. The general formation of the country is granite. The soil varies considerably from rich loam and strong blacksoil to sandy and otherwise inferior soils in some parts of the ridges and back country. It is chiefly forest heavily timbered, with here and there open flats along the watercourses. Open forest with rich black and chocolate soil is also

met with. Generally speaking, it is not naturally well watered, but water in most parts can be obtained by sinking from 15 feet to 75 feet. The average rainfall is about 30 inches.

MARYBOROUGH TO DEGILBO.—Along this railway as far as Boompa Railway Station the country is not first-class, being heavily timbered with ironbark, bloodwood, stringybark, &c., and the soil of a light, sandy nature, which would probably be suitable for fruit and grape growing. Area, about 45,000 acres. From Boompa on to Degilbo, 58 miles from the coast, the country is closely settled, but there is still an area of about 12,000 acres available of a much better quality, and dairying and general farming is successfully carried on by the settlers. Average rainfall, about 40 inches.

MARYBOROUGH TO CORDALBA.—Except around Childers, where all the land has been alienated, the available country along this railway, comprising an area of about 90,000 acres, is of rather poor quality, more suited for grazing than agricultural purposes. Average rainfall, about 35 inches.

MARYBOROUGH TO BUNDABERG.—Though there is a large area along this line of vacant Crown land, amounting to some 200,000 acres, the great majority of the land suitable for agricultural purposes has been alienated. Average rainfall, 46 inches.

BUNDABERG TO MOUNT PERRY.—The area of Crown land along this railway is about 35,000 acres. In the vicinity of Kolan the soil is of a poor sandy nature; extending westerly this merges into rough quartz ridges, but around Mount Perry itself there is still a considerably large area suitable for agricultural purposes. Average rainfall, about 33 inches.

BUNDABERG TO GLADSTONE.—Generally speaking, the Crown land along this railway, comprising an area of some 350,000 acres, may be generally described as forest country, more suited for grazing than agricultural purposes. It is well and naturally watered, and there is a fair proportion of the flats along the various rivers and creeks suitable for cultivation, thus rendering a large part of it suitable for dairying. Average rainfall, about 40 inches.

GLADSTONE TO ROCKHAMPTON.—The area of Crown land along this railway is about 300,000 acres, and is somewhat similar to that between Bundaberg and Gladstone, though there is a greater proportion of rough, scrubby, mountainous country. Average rainfall, about 40 inches.

ROCKHAMPTON TO LONGREACH.—From Rockhampton to Westwood the suitable land is practically alienated. Beyond Westwood and on to Emerald, 166 miles from the coast, there is an area of about 500,000 acres of more or less scrubby country, a large proportion of which, when cleared, would probably be suitable for agricultural purposes, though there is practically no close settlement there at present. From Emerald to Alpha, 273 miles from the coast, there is an area of about 180,000 acres of somewhat similar country. Average rainfall, about 23 inches. From there on to Longreach, 428 miles from the coast, except for a small area round Barcaldine, there is a very large proportion of open blacksoil downs, at present held principally under lease for grazing selection.

INGHAM.—In the coastal part of this district, principally between Cardwell and Ingham, there is an area of about 2,000,000 acres of unalienated Crown land. The range comes close in to the coast, varying from 4 to 20 miles therefrom, and is densely covered with scrub, with here and there large masses of rock, but the greater portion contains a very rich, dark-chocolate soil. The country between the range and the coast is comparatively rough, but there are good flats along the creek, and the soil is of a rich quality. Average rainfall, 87 inches.

MOURILYAN AND GERALDTON.—Practically the whole of the suitable land in this district has been alienated, but there is still an area of about 30,000 acres available. The soil is of volcanic origin. Average rainfall, 144 inches.

CAIRNS.—In this district also the best of the land along the rivers and creeks has been alienated, the balance is somewhat rough in character, and the soil of volcanic origin. It is estimated that there is about 130,000 acres available. Average rainfall, about 94 inches.

BURNETT DISTRICT.—A proposal is now on foot to open up this district by a system of light railways, and a report is now being obtained for Parliament. At the present time, owing to its inaccessibility to railway, the nearest part being some 25 miles from Degilbo; it is used purely for grazing purposes, but there is an area of some 1,500,000 acres of Crown land, including 256,000 acres recently resumed from the various holdings, and capable of supporting a large agricultural and dairying population, comprising as it does a considerable area of country perhaps as well adapted for dairying and general farming as any in the State. Average rainfall, about 30 inches. Taking this area into consideration, it would bring the total area at present available for settlement up to 8,613,453 acres.

Attached is a list giving the area at present open for selection, in the different modes, in the various land agents' districts:—

"The Land Act, 1897," and "The Prickly Pear Selections Act of 1901."

Agricultural Farms only.	Grazing.	Scrub Selection.	Prickly Pear Selection.	Total.
...	776,821	...	...	790,563
...	295,952	...	...	301,539
375	234,167	...	...	242,453
...	339,259	...	...	450,860
302	17,920	...	...	226,548
...	230,301	...	...	564,261
...	...	...	...	8,881
...	...	...	...	139,423
...	777,227	...	...	791,404
...	774,710	...	...	775,530
8,130	469,708	...	...	535,429
...	35,570	...	...	71,226
...	311,260	...	...	311,260
...	1,012,688	...	...	1,023,968
2,160	206,899	6,138	3,377	418,750
1,030	86,044	...	...	174,074
5,852	369,064	...	...	404,113
...	...	...	...	26,425
...	397,969	195,027	...	612,001
420	18,900	...	...	192,683
...	69,503	...	...	82,428
...	467,191	...	...	467,831
...	27,851	...	...	285,112
...	30,081	20,972	...	175,454
61	9,358	...	...	123,115
...	412,791	...	...	412,991
...	82,973	...	...	82,973
...	185,546	...	...	291,682
...	4,650	...	...	274,177
640	...	...	...	30,648
15,207	46,046	...	...	115,108
...	...	...	...	1,980
330	...	...	...	191,392
341	314,628	...	...	575,162
85	500,691	2,552	...	789,759
...	770,678	65,259	...	855,086
...	80,681	...	...	86,700
...	655,499	...	...	736,617
...	4,948	...	...	87,856
...	424,611	...	...	426,576
...	173,818	9,000	...	182,818
933	364,276	...	...	368,408
...	550,155	...	...	553,995
...
40	198,980	...	...	291,621
...	30,685	...	...	180,611
70	2,560	...	...	39,725
...	262,714	...	...	262,714
...	346,039	...	...	347,022

PICKLING WITH FORMALIN FOR PREVENTION OF FUNGUS DISEASES OF CEREALS.

Mr. W. L. Summers, Inspector of Fertilisers in South Australia, writes as follows in the *South Australian Journal of Agriculture* of 1st April:—

South Australian farmers have to contend against the ravages of several diseases which attack their cereal crops. The principal of these are red rust, "black rust," bunt, smut, and wheatstem-killer or takeall. The experience of the past few years has demonstrated beyond a shadow of doubt that as far as red rust is concerned the farmer can protect himself against any serious loss by the cultivation of varieties of wheat which have proved resistant to rust; but, so far, none of the other diseases referred to have been successfully combated by the development of varieties not liable to attack. Bunt, or smut, as it is usually called, has for many years been dealt with by means of various solutions in which the seed is treated before being sown. The control of the disease known here as black rust has, however, always been regarded as unamenable to such treatment, but quite recently Mr. D. McAlpine, Vegetable Pathologist to the Victorian Department of Agriculture, has stated that this disease is really "leaf smut," and has recommended the use of formalin pickle. Practically no experiments have been undertaken in Australia in the pickling of the seed to prevent damage by the wheatstem fungus, or takeall, but we believe this work will be taken in hand by Mr. McAlpine during the coming season.

In view of the inquiries received concerning the use of formalin as a preventive of bunt, smut, and so-called black rust, the following report by Mr. McAlpine, republished from the *Agricultural Journal* of Victoria, will be of interest to those farmers who intend using formalin this year.

Bunt (*Tilletia*), or stinking smut as it is usually called, is easily recognised, both from the appearance of the grain and the ear. The grain is filled with a black mass of fungus spores which emit an odour not unlike stinking fish, especially when rubbed, and the skin is of a dark, unhealthy, green colour. The ears affected remain longer green than healthy ears, and, being lighter than the sound ones, do not bend over, but remain upright.

Smut (*Ustilago*) is also characterised by the grain being filled with a mass of black, dusty spores, which are very conspicuous, and usually the loose spores are scattered by the wind. In barley, however, there is the naked and covered smut, and it was the latter variety dealt with in these experiments.

In order to understand the treatment, it is necessary to know that infection can only take place when the plant is young and tender, and the fungus filaments grow inside, keeping pace with the growing plant, until the young seeds are formed, and then the fungus uses all the nourishment stored up there for the production of its reproductive bodies or spores. These spores are so light and so numerous that in harvesting operations they readily become attached to the healthy grain, and if the conditions are favourable infect the young plant when germination occurs. It is evident that prevention must be resorted to, and the seed to be sown is treated in order to destroy or prevent the germination of the spores. The most commonly used steep or pickle is that of bluestone or sulphate of copper, but corrosive sublimate and formalin have also been found efficacious.

BUNT OR STINKING SMUT OF WHEAT.

In order to test the relative merits of bluestone and formalin for the stinking smut of wheat, experiments were carried out at Port Fairy with both. Seed wheat was thoroughly infected with the spores of stinking smut, and divided into three portions, one being treated with bluestone solution, another with formalin, and a third left untreated. Large patches were sown in each case, and carefully examined by Mr. Goldie and myself towards the end of December.

Bluestone was used at the rate of 1 lb. in 5 gallons of water, and formalin at the rate of 1 lb. in 40 gallons of water.

The method adopted was to spread out the seed on a wooden floor and sprinkle the solution over it, turning the grain over and over, either by shovelling or raking, so that all the grains became thoroughly wetted. The seed was then spread out to dry, and it was found that if left in a thin layer over night it was ready for sowing in the morning. Instead of sprinkling, dipping may be resorted to. A bushel or so of seed is placed in a bag and dipped in the solution, taking care that all the grains are thoroughly wetted by shaking the bag and plunging it in and out. In the case of bluestone only a minute or two is necessary for the dipping process, on account of its corrosive action, but in the case of formalin five minutes were allowed. In transferring treated seed from one bag to another, care has to be taken that the bags so used are either absolutely new or have been dipped in the solution to destroy any smut in them.

The result of the treatment was very conclusive. While the untreated plot contained at least 50 per cent. of smut, careful search over the treated plots failed to reveal a single smutty head. Thus both solutions were equally successful in destroying the smut, but it was noticeable that the plot treated with formalin looked much better, and was a little further advanced. Mr. Goldie also informed me that from the very start the formalin plot had a healthier appearance.

BARLEY SMUT.

The same treatment was carried out with barley, but on a much larger scale. Chevalier barley, sown in the beginning of July, was treated with formalin, 1 lb. in 40 gallons, and a portion left untreated. It was reaped on 21st December, and, while on the 20 acres treated not a single smutty ear could be seen, in the untreated portion there was not a single stook in which several smutty ears could not be detected. Mr. Goldie is naturally very pleased with the simplicity and efficacy of the formalin treatment, and will use nothing else in future.

RELATIVE MERITS OF FORMALIN AND BLUESTONE.

In comparing the two solutions of formalin and bluestone it must be remembered that formalin is volatile and non-corrosive, while bluestone is very corrosive; but the latter solution may be used again and again without becoming exhausted. It follows, therefore, that only the amount of formalin should be prepared that will be required for immediate use, and sprinkling should be preferred to dipping. The original formalin solution should be kept securely corked. The cost will be practically the same, and the formalin is less injurious to the grain than bluestone. The corrosive action of the bluestone can be lessened by dusting powdered lime over the grain immediately after treatment, but this prevents sowing with the drill. The destruction of a certain proportion of the grain is not an unmixed evil, because it will act most injuriously on those already somewhat damaged, and consequently most likely to produce a weakened plant.

Schering's formalin should be asked for when purchasing. This can be obtained at about 2s. 10d. per lb. in Adelaide, in original 1-lb. bottles. Formalin being a colourless liquid and poisonous, must be kept where there is no chance of children or others obtaining it in ignorance of its nature.

MAKING BARREN LAND FERTILE.

It has always been accepted as a fact that the great fertility of the soil bordering the Nile is due to the rich silt brought down from the mountains during the annual overflow of the river. This would now appear to be one of the many delusions of our youth, if the reported discovery by a party of experts sent to Egypt by the United States Department of Agriculture is to

be credited, and there is no reason to doubt that the Department has made a discovery which may have a very world-wide influence on the agricultural industry. It seems that, instead of the fertility of the Nile soil being due to the deposit of silt, it is really the effect of a plant called "Berseem." This is a species of *Trifolium* which has the power of reclaiming barren soils by absorbing the saline and alkaline properties of the land, of enriching it with nitrates, and maintaining it in a productive state. It also possesses the remarkable power of destroying most other weeds, and the experts state that they rode through miles of fields of Berseem in which scarcely a weed was to be seen. This *Trifolium* is a composite between lucerne and clover, and it is in every way more delicate and succulent than either. It is greatly relished by stock of all kinds, such as horses, cattle, camels, and donkeys, and even the fellahs or peasants use it as an article of food. Should this discovery be confirmed by experiments which are now being made, it cannot but prove a most valuable one to the agricultural world. There is, however, to our thinking, a "fly in the ointment" in that, if the plant has the singular power of destroying many kinds of weeds, it may also turn out to be destructive of economic plants, in which case its introduction into our State would, instead of being a blessing, turn out to be a more terrible enemy than dodder, nut grass, lantana, or prickly pear. For it must be remembered that weeds are merely plants in the wrong place. Oats growing up in manure placed on land become weeds. We may, however, rest assured that the United States Department of Agriculture is too wideawake to introduce such a plant to American soil without making exhaustive experiments to determine this important point.

THE VISION OF REPTILES.

In this country, where snakes of various kinds are fairly numerous in some districts, there is yet a considerable amount of ignorance concerning their peculiar characteristics. A snake may be approached, for instance, by a person walking quietly to within a few feet before the reptile will appear to take notice of the intruder. As soon as it becomes aware of danger, it will invariably attempt to escape. If it cannot do so, it rapidly protrudes and withdraws its forked tongue, which many ignorantly take to be its sting. The reason for this is, that a snake is destitute of the organs of hearing, most reptiles being nearly or quite deaf. Their best sense is supposed to be that of sight, but even with this sense they are very badly provided. Alligators are best off in this respect, since they can see about six times their own length. Whilst some snakes, and those the most keen-sighted, can see a man at one-quarter of their own length, others can only distinguish objects clearly at a distance of from one-fifth to one-eighth of their own length. To compensate for this disability they are provided with a long, slender, forked tongue, which, on the principle of the tuning-fork, is sensitive to the motions of the air, and, by its vibrations, indicates to the reptile the direction from which danger is approaching. By some marvellous instinct, snakes, in common with some other reptiles, such as frogs, can detect the presence of water at long distances, and will travel in a straight line to it, even when it is so far away that no sense that we know of would enable them to locate it.

The American naturalist, Werner, who has made the habits of reptiles a study, says that this is due to some sort of electrical action akin to chemical action, but he cannot explain how or why it takes place. Fish, again, can only see an object at a distance of one-half their own length, and are attracted to the bait either by scent or by the vibration of the water caused by the plunge of the bait when thrown into it, or else by the struggles of the living object, such as a worm, used for the purpose of attracting them.

Dairying.

WILL THE WAR AFFECT THE BUTTER TRADE?

Great Britain imported last year from all sources 203,034 tons of butter. Of this quantity the Australian colonies and New Zealand supplied but 18,461 tons; Canada, 9,270 tons; Denmark, 88,583 tons; Russia, 24,216 tons; France, about 20,000 tons; other countries, such as the Argentine, Sweden, Holland, Germany, Norway, Belgium, and the United States, making up the balance. However, we have here nothing to do with any butter-exporting countries except Denmark and Russia. The Russian butter is made in Western Siberia, and the export trade amounts to between £2,600,000 and £3,200,000 annually, and it is no secret that enormous quantities of Siberian butter are exported to Denmark, where it is said to be re-worked and sent out as Danish butter. The Russian Government encouraged the dairying industry and the development of cold storage by liberal subsidies. These subsidies and other concessions have been withheld since the beginning of the war with Japan. All the refrigerating cars on the Siberian Railway are said to have been taken by the Government to be converted into cars for the transportation of troops to the Far East, so that the export of butter has suddenly come to a standstill.

There would, however, appear to be some mistake in the report that *all* the refrigerating cars have been taken off, for we find, from a letter to the *London Grocer*, signed Willer and Riley, Limited, butter merchants of Tooley street, London, and dated 11th March, 1904, that their Kourgan (Siberian dairying district) agent had telegraphed on 29th February that the railway officials expected the line to be clear of troops in three or four weeks. The agent was, therefore, very sanguine about the despatch of the regular weekly supplies of butter. For the first week in March, London received 1,000 casks, which came by refrigerator wagons from Siberia, and a telegram on 11th March from the Kourgan agent stated that he had since sent a shipment in refrigerator wagons. Under these circumstances, the report published by the *Siberian Butter Gazette*, that they had received a telegram from Kourgan, dated 27th February, stating that "*all* refrigerator butter wagons are to be altered for transport of troops," must be taken with a grain of salt. The Kourgan agent had heard nothing about the telegram that refrigerator wagons were to be taken and altered for the transport of troops.

Should such action not have been taken by the Russian Government, then there will probably be little, if any, diminution in the export of Siberian butter. If, on the other hand, the report is correct, then the place that Siberian butter filled in the London and Danish markets will be vacant, and those markets will be deprived of about 25,000 tons annually, and that quantity can be supplied at present, and for a long time to come, from no other source. The Danish supply must then materially fall off, if the general report be correct that much Danish butter is Russian re-worked. The result must be that prices during the war will advance, to the great benefit of our colonies and other butter-exporting countries. Russian butter is of an inferior description, manufactured, according to a report by Mr. H. Cooke, who undertook a commercial mission to Siberia on behalf of the Board of Trade, in a filthy manner, amidst foul, evil-smelling surroundings, by owners and others with no technical knowledge, and yet its average price in the home market during the past year has been 90s. per cwt.

Speaking of the Siberian dairies, Mr. Cooke says:—"In summer the presence of a dairy is heralded at a considerable distance by the terrible smell. To diminish the foul odour, the owners have recourse to a mixture of carbolic acid, sprinkling the floors and walls with it." He goes on to say:—"Dirt and disorder find a welcome there (in forty Siberian dairies). The majority are dirty in the extreme. The utensils are badly cleansed, the floors unwashed, the

ceilings and walls dirty, milk spilt about, and the atmosphere of the dairy foul. The output is butter of poor quality. No attention whatever is paid to the water serving for washing purposes, whether for the utensils or for the butter, foul and stagnant water being at times used."

Carpe diem should now be Queensland's motto for dairymen. If the war drags out to any length, the reduced output of butter must be supplied from elsewhere by some means, and with her splendid dairying country, her excellent dairy stock, her clean dairies, and expert advice, together with the facilities for sending the butter to the coast in refrigerating cars and to London by the regular service of the Aberdeen line of steamers, Queensland should be able, by straining every nerve, to increase her exported output from 120 tons to 250 or 300 tons per week.

NOTES FOR BUTTER-MAKERS.

By G. S. THOMSON, F.R.S. Ed., Government Dairy Instructor.

THE EXPORT OF BUTTER.

As the export of butter is increasing, I would draw the attention of butter-makers to the necessity for care in the preparation of butter intended for the home markets. My recent visit to the large depôts at Tooley street, London, and other parts of the United Kingdom elicited information which will be of interest for those engaged in the business here. It is a matter for sincere regret that Australia has not come up to expectations of the London graders as a butter-producing country, and perhaps we will admit that our treatment of the export trade leaves much to be desired. I am not in a position to give an account of my inquiries on the commercial aspect of the trade, but I have cause to remind exporters of the necessity for placing on the British market a product of greater uniformity than has been the custom in the past. Authorities in London unanimously agree that the best Australian butter cannot be surpassed, but the want of reliability of our shipments has been a subject for severe comment. We have not studied our interests in the home market sufficiently, otherwise we would have been more guarded in our export of low-grade produce. An outlet must certainly be found for the surplus butter, but it has been taken advantage of to the serious detriment of the industry. Our rival country, Denmark, has not trifled with her great and increasing interest in the London business, and the outcome of her praiseworthy efforts is illustrated in the increasing demand for Danish butter. So well has Denmark studied the wants of the British consumer that instances are common of the small farmer in England buying the Danish article and selling the supply of his own farm locally.

While discussing the subject at Tooley street, I raised the question of the great distance our butter has to travel as a serious objection to its arrival in London in the best condition. In reply, I was asked to judge some boxes of colonial produce, which had been removed from storage a few days previously, after lying in the firm's cool chamber for weeks. The quality of the samples thoroughly demonstrated my contention that sound butter, when properly handled and chilled, will arrive at Tooley street, London, from Australia in practically the same condition as it left the factory, and will maintain a perfect flavour for a further period of cool storage.

Further argument brought forward from one buyer that grading of cream and butter at many of our factories must be unknown, and a recommendation to spend a month in Denmark would enable me to grasp the reasons of the success of that country. I had previously decided to go there, and after spending some days among the dairy produce merchants in London I left for Copenhagen, where I made a careful inspection of the milk depôts, factories, agricultural experiment stations, and dairy laboratories. I was impressed with the determination of the Dane to uphold his reputation as a butter-maker, of

his eagerness to improve his appliances and methods, his thirst for the cream of foreign dairying literature, and readiness to put every sound and profitable suggestion into practice. One of the most useful institutions visited was the Government butter-testing department, where hundreds of casks of butter are received fortnightly from the factories for examination purposes. These are despatched by the factories on receipt of telegram from the department, and represent an average of the bulk supply prior to its removal from the country for carriage to the London steamers. As only one box is forwarded at a time, there must have been some hundreds of factories represented at the period of my visit. Judging is carefully carried out by a board of competent men, and manufacturers are notified of their success or failure, with instructions for future treatment when found necessary.

THE VALUE OF LIME WATER.

Having enjoyed the privilege of testing the samples, I was surprised to find a marvellous equality throughout the vast number of casks. My endeavour was now to ascertain how this distinguishing feature of Danish butter was maintained, and with that object in view I left for the country districts to study the question on the spot. Calling at the farms first, I soon recognised that care in milking was receiving very strict attention by the farmers, and a system of milk cooling was, in a great majority of instances, practised. Beyond the latter element in milk preservation, nothing else of special interest to the butter-maker was in evidence. Proceeding to the factories, my attention was at once drawn to the perfect cleanliness of the buildings, machinery, and utensils. The air in the rooms had a feeling of purity and sweetness, and everywhere one found illustrations of the factory-worker's sense of responsibility of the dangers of germ life, and how to successfully enforce preventive measures against the possibilities of bad odours in the factory. The very wide application of lime water to utensils and hot lime to the inner walls of the buildings is an important factor in the manager's education, and I did not find one instance of neglect to enforce one of the most valuable practices in Danish dairying. One interested person remarked to me that factories were drenched in the solution every day of the week, and from my observations there was no exaggeration in the statement.

The question arises—If the experience of the Dane goes to prove that taints have quickly disappeared in their cold climate since the uses of lime became general, why should we not have a much greater reason to adopt the system in a climate of far higher temperatures, and with factories and farms less favourably situated to ensure freedom from hurtful smells? I question if our farm utensils, butter-workers, pounders, and churns possess that sweetness of smell which is so desirable in successful butter-making, and so characteristic of every item in the equipment of a Danish milk farm and factory.

FLAVOURS IN DAIRY PRODUCE.

By G. SUTHERLAND THOMSON, F.R.S. Ed.; N.D.D., &c., Government Dairy-Instructor.

Very little has been published up to the present time on the above subject, and there is no reason to disbelieve that a good field is open to the experimentalist in this very important branch of science. Unfortunately for the success that follows original investigations, the study of flavours in dairy produce has been practically confined to the subject of bacteriology, which has undoubtedly attracted the attention of students to the neglect of the chemical and botanical sciences. It is admitted by practical and scientific authorities alike that plants play a part in the flavour of farm produce, and the health of stock has a certain influence on the quality and keeping properties of both butter and cheese. But seldom is the chemist, the botanist, or the veterinary

surgeon consulted when a serious taint in milk, cream, or other fermentative products is under consideration; invariably, the bacteriologist is the scientist who is applied to for a satisfactory solution of the problem. And this is not the worst feature, for the practical side of dairying is invariably slow in giving assistance to discover a cause and remedy. Practice and science should go hand in hand, and want of knowledge of the former is a most serious hindrance to the success of the latter.

We hear in lectures and we read in books that the good flavour of our dairy produce comes from the growth of germ-life, but we are seldom told that the food of cows has an influence in imparting a pleasant aroma to the butter. Farms situated in hilly or undulating country are reasonably credited with a more attractive flavour in the home-made article by reason of the shorter, sweeter, and well-matured herbage; while in the flat, deep, rich, well-matured land where the food is rank and succulent there is a deficiency in the characteristics of choice butter. Personally, I have had experience of this in the mountainous districts of Scotland, where it is common to hear the butter-makers prize the high slopes of the farm from which the tastiest butter is produced, and I can remember when the produce of stubble-fed cows commanded the highest prices in the home markets. To clearly illustrate that plant-life is responsible for flavours in dairy produce, we have only to remember the influence that weeds possess in imparting their particular and disagreeable taint to butter. Few farmers are unfamiliar with the flavours of wild mustard and turnip in milk, and the pungent taste that is transmitted to butter manufactured in districts where cress and other unwelcome plants unfortunately abound.

That our local and export trade suffers annually from the evil effects of plant-life has been proven by sampling the affected produce. Further evidence of the evil results following plant-life in the milk supply is found in farm practice, for it is well known to the dairyman that cultivated crops like lucerne, rape, and cabbages want care when fed to milking stock, and likewise are the farmer's attention and discretion required when silage is given alone to force the milk flow. As certain crops endanger the flavour of milk by imparting taints peculiar to the kind of plant, likewise have foods an influence on the fat percentage and solids of milk. We are told, and there is good ground for believing, that cows fed on large quantities of brewers' grains yield a milk poor in keeping qualities and low in fat, and some authorities regard its use as unsafe to the health of infants.

Again, those who have had experience in the feeding of milking stock in Great Britain are thoroughly acquainted with the taint-producing properties turnips have on the flavour of milk, and that oily foods are fed with caution to avoid damage to texture and aroma of butter.

Stagnant, impure, and mineral water for milking cows carries with it soluble constituents that lower the keeping quality of milk, and it is an established fact amongst practical men that the produce from cows fed on sewage pasture has defects in flavour, and soon deteriorates with age.

We are also aware that the first milk (colostrum or beastings) and the last (before calving) are quite unsuitable for dietetic purposes; and when used for butter or cheese making objectionable flavours in the butter follow, and marked decomposition in the manufactured cheese. Experience has taught us to reject "new" milk, and also at a time when cows show a desire to mate and are drying off, when a salty taste is found.

In further support that the flavour of milk is acted upon by foods, purgative medicines given to the cows find their way into the udder of the animal, and are conveyed to the sucking calf, without entirely losing their active properties. In the case of the mare and sow this influence of drugs is more clearly proven.

But not alone is the flavour of butter influenced by food—colour and texture respond to the changes in feeding. Differences in the shades of colour occur very distinctly in countries where many varieties of green feed are grown.

In fields in Great Britain one can find the pastures aglow with the buttercups and bright-yellow coloured wild flowers, and cows grazing on these fields yield a milk of a high colour. As certain foods increase the brightness of milk, others make it pale, which is the experience of observant, practical dairymen in this and other countries.

TAINTS IN BUTTER.

We will now deal with bacterial taints, giving an explanation of the causes of these unwelcome changes, which are recognised as the greatest and most costly evils affecting the success of factory dairying. So alarming have these losses been in past years that were it possible for us to give a yearly estimate of the avoidable damage wrought in milk and cream it would cause much reflection on our past methods of handling the raw produce on the farm. The question may be asked, Why have we neglected so serious a matter? The principal answer is because we have all along been too conservative in our pursuit of dairying, believing that old practices and principles were good enough for repetition in the times of keen competition, when we are striving to gain a footing and establish a reputation among rival countries in the butter markets of the world. We forget that the results of competitive struggles have educated consumers of dairy produce to exercise a delicate and sensitive palate difficult to satisfy; and until we meet with the approval and confidence of our customers at home and abroad the success which we are striving to attain will be seriously impeded. A second reason has been a want of opportunities whereby those in the industry could be made familiar with modern methods and teachings, but it will be a serious fault in the dairy farmer of to-day if he neglects to make use of the assistance which is placed at his disposal in so many ways. Let it be clearly understood that the prosperity of the industry rests with the factory supplier—that he is chiefly responsible for the flavour or quality in our produce.

AROMA IN BUTTER.

We can define a good flavour in butter as something that pleases the taste, something that leaves a pure and delicate aroma of cream in the mouth. There is nothing that you can object to—no bitterness, no acidity, no stale or aged taste. It is alone the flavour of a choice product—butter that has been manufactured from choice cream separated from pure and carefully handled milk. Now that it is understood that the finest butter can only be made from the best of milk and cream, it will be well to explain what gives butter its good, attractive aroma. It is not chiefly the food that the cow consumes, neither is it the breed of cattle, but it is something that has been formed in the cream as a result of the care and cleanliness that the farmer has given to the handling of his supplies before being sent to the factory. The true answer is because the milk and cream have been kept free from the attacks of particles of dirt and unpleasant smells. But why should I use the word "attacks" in my answer? Because the living organisms that produce the taints or bad flavours are always to be found clinging to the atoms of dust or dirt that fall into the milk or cream supply; hence the great evil of dairying is neglect to keep our produce free from the attacks of germ-infested dirt. Smells also taint the raw product, not only when the milk or cream is cold, but when it is warm and fresh. It is needful, then, to prevent the development of any odours about the dairy that are objectionable to ourselves and prove hurtful to the quality in either butter or cheese.

HOW TO KEEP BAD FLAVOURS OUT.

I will now classify, in the order of importance, what is necessary to the manufacture of choice-flavoured and good-keeping butter:—

1. Perfect cleanliness in milking.
2. Perfect cleanliness of milking-yards.

3. Perfect cleanliness of the utensils used for keeping the milk or cream in.
4. Perfect cleanliness of the room or place where the milk or cream is stored in.
5. Perfect freedom from objectionable smells in and around the dairy.
6. Skilled treatment of milk or cream before it reaches the factory.
7. Conveyance of milk and cream to the factory in a sweet and pure condition.
8. Purity of drinking water for cows.
9. Freedom of taint-causing weeds and plants from the food of milking stock.
10. Skill in ripening cream and churning it into butter.
11. The uses of preservatives.

Let us consider Rule No. 1. As much taint-producing "dirt," with its living organisms clinging to it, is at liberty to fall into milk at this very important stage of dairy work, we recommend the adoption of simple practices in order to prevent the milk becoming sour or ill-flavoured. What are these simple, practical, and preventive measures? They are as follows:—

1. Milk after the udder and flank of the cow have been brushed and made damp with a clean cloth.
2. Milk after the teats have been washed.
3. Milk after the hands and clothes are clean.
4. Milk in a clean place.

In carrying out these recommendations there is nothing burdensome in it, and the profits and good name that will be made by suppliers, factory, and industry will be a good reward. Little or no extra time will be required compared to the common and objectionable practices of to-day. A boy can precede the milkers, and do the brushing and damping of the udder and flanks and washing of teats. Such a provision will leave the milkers free to do only one thing, thus avoiding as much of the dirty work as possible. The same person can provide water for the milkers to wash their hands in after finishing each cow, also a clean supply for moistening the hands during milking. I would suggest that those engaged in milking should provide themselves with two or three cheap suits of white overalls that can be thrown on immediately before the operation is commenced and taken off immediately it is over. Let the young people on the farm be taught the value of care and cleanliness in milking, and as they become older the knowledge gained will enable them to appreciate and understand the true value of dairying education. It will be by this means that the foundation of the industry will be greatly strengthened.

Rule 2.—Perfect Cleanliness of Milking-yards.

Some farmers will wonder why so much has been said about this part of dairy instruction. It is because we have already traced taints in produce to the insanitary condition of milking-yards. Some time ago my attention was drawn to a very peculiar flavour in cream and butter. Scientific examinations were made of the affected samples, and before long I succeeded in finding that the injury to the cream was the work of a particular germ, and was not caused by the ill-health of the cows or by taint-producing weeds in the food. As the bacteriological investigation was being pursued, the factory manager was making inquiries at the farm from whence the cream was supplied. There he was successful in arriving at the source of the trouble, which had its origin in the uncleanly condition of the ground where milk was kept during the night. As soon as this was explained to the farmer, he recognised the error of having his milk and cream cans in such a dangerous place, and at once set to work to put everything in a satisfactory state. Since this was done, no further

trouble has been experienced. Other illustrations of the same kind could be given, but I think the above is sufficient to fully convince readers of the dangers that result from want of simple precautionary measures on the farm. To reduce the risks and make the milking-yards pleasing to the eye, have the milking-bails kept white with linewash, and twice daily have the droppings from the cows removed to the manure or refuse heap.

Rule 3.—Perfect Cleanliness of the Utensils Used for Keeping the Milk and Cream in.

The cleanliness of the utensils is another important matter which deserves great care on the part of those who are trusted with the work. When sufficient washing has not been given to cans, fermentation or decay quickly follows in the vessels, and when a supply of fresh milk or cream is added it is at once attacked by hurtful germs, and immediately begins to become sour and tainted. You can make this very clear to yourself by a simple experiment. Take two cans of equal size, put a quantity of milk into each, leave the cans in a warm place for 12 hours, after which pour the milk into another vessel. Wash and scald one can thoroughly, and dry by exposure to direct sunlight; rinse the other out with cold water, and leave standing for 8 or 10 hours. Add fresh supplies of milk to both cans, and next morning take the milk to the factory and have it tested for its keeping qualities. A more conclusive experiment might be done in this way:—Clean and scald two cans, and add equal quantities of milk fresh from the cow; to one vessel add half a glass of acid milk or whey, and afterwards leave the cans for a period of 12 hours or more, according to the convenience of the supplier. Take to the factory, and have both samples examined for extent of sourness. In sterilising dairy appliances you cannot be too particular in the free use of boiling water and soda. And I would point out that extra care is wanted in thoroughly cleaning the seams of milk and cream cans.

Rule 4.—Perfect Cleanliness of the Room or Place where Milk or Cream is Stored in.

Everyone will agree that it is absolutely necessary to use storage rooms for no other purpose than to keep the milk and cream in. If, on the other hand, it is used for vegetables, meat, harness, and clothing, there are sure to arise injurious odours which will afterwards be found in the stored produce. Have the walls of the room whitewashed with hot lime every three months, and see that sufficient ventilation is provided. Erect wire gauze over the windows, and a gauze inside door will be found very profitable for admitting a free circulation of air, and preventing the admittance of flies and other insects.

Rule 5.—Perfect Freedom from Objectionable Smells in and around the Dairy.

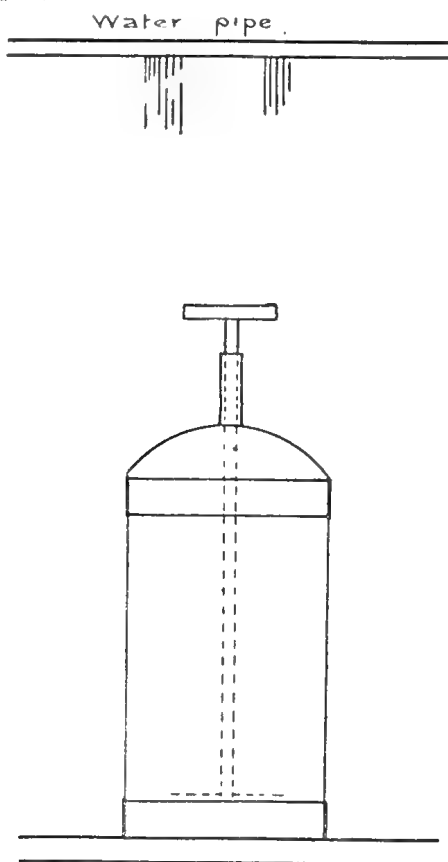
The presence of smells in the air surrounding milk or cream is most injurious, owing to the rapid absorbing powers of the raw produce. You can prove this by leaving a small quantity of cream in a room containing the odour of turpentine, kerosene, onions, or any strong-smelling substance, and in the course of a few hours the cream will taste of the impurities in the air. Likewise will milk absorb bad gases in cowyards, and this will be tasted in hot milk as well as in cold.

Rule 6.—Skilled Treatment of Milk and Cream before it Reaches the Factory.

In the milking of cows and in the cleanliness of yards there may, in some cases, be little fault found, yet the milk and cream may become speedily sour and tainted through being kept in closed cans and shut up in a warm room or left uncovered in a dusty place outside. It is recommended to place freshly separated cream in the coolest spot in the dairy. Sinking a well for that

purpose only, and stirring the cream at intervals during cooling, would repay the labour incurred. Let the following method of cooling the cream, which has already proved profitable, be tried wherever water is procurable:—

Overhead erect a watertank, attached to which is an iron pipe—preferably gunmetal—perforated with small holes situated at short distances from each other. Underneath is a plain wooden stand, on which the cans are placed. The cans are of the ordinary shape, and have a specially constructed lid, with a tube on the top 8 inches long, through which passes the handle of the stirrer. On the cans there are stout covers, made so as to be easily removed. From the top the drops of water are regulated so as to keep the cans continually moist. The accompanying diagram illustrates the process of cooling:—



To prove the efficiency of the cooler, I had the following test conducted by a dairymen in South Australia, who has been most successful in the application of the system.

TEMPERATURES OF CREAM AND SKIM MILK.

Temperature of Air in the Shade, 95° Fahr.

	BEFORE COOLING.	AFTER COOLING.			
	11 a.m.	2 p.m.	5 p.m.	8 p.m.	6 a.m., next morning.
Cream—	°	°	°	°	°
No. 1 can, full	82	74	68	67	61
" 2 " "	82	75	66	66	60
" 3 " "	80	74	67	66	60
" 4 " half full	84	75	68	66	59
Skim milk, full	84	76	70	69	...
Water used	70	72	78	78	68

By the foregoing results it will be found that the average fall in temperature of the five cans during the first three hours was 10 degrees, the second 7 degrees, the third 1 degree, and from 8 p.m. to 6 a.m. 6 degrees, making in all 24 degrees. The enterprising farmer informed me that, had the day been warmer than 95 degrees, the temperature of the cream would have been lower; but on no occasion has he been compelled to churn the ripe cream at a higher temperature than 58 degrees Fahr. Milk and cream suppliers will find the cost of erection of this cooler very little; all that is necessary in the shape of a building being low canvas walls of skeleton woodwork, and a feature of the system is its adaptability to the treatment of small supplies on the farms as well as a large number of cans. When the above system of cooling cannot be adopted in the preservation of milk, let the aerators now on sale be put into practice, all being efficient appliances for use on the farm.

A novel method of cooling dairy produce is to be seen on the farm of Mr. Batemann, of Laidley. This enterprising dairyman, with the able assistance of his wife, is working his farm on lines worthy of repetition wherever a cream separator is in use. A simple device, comprising a circular stand of shelves, is erected in the dairy, over which is a canvas cover, the top part being submerged in a receptacle of limewater. By this means a constant circulation and evaporation of water goes on day and night. The higher the temperature the more moisture is given off, which correspondingly extracts the heat from the air inside of the stand, and thereby cools the stored produce and retards fermentation.

Mr. Batemann is a firm believer in carrying out the practices of the farm in a systematic manner, and his efforts have brought him a deserving reward, for taints and bad flavours common to cream and butter are not met with in his dairy. Mr. Batemann is a modest and unassuming man—he informs his inquirers that he has still much to learn about the many branches of dairying; what, then, can we think of our numerous friends whose knowledge is superficial? But the proverbial boast bursts from them: "We know everything—there is nothing more to learn."

Rule 7.—Conveyance of Milk and Cream to the Factory in a Sweet and Pure Condition.

Having adopted the recommendations in Rule 6, it will be a less difficult matter to provide the factory with sound supplies. With the already covered milk and cream cans well saturated with water, let them be forwarded in that condition, and, no matter how warm the weather may be, a quick rise in temperature and degree of acidity will be prevented. If covers have not been employed as suggested in Rule 6, have them made purposely for use in the cartage of milk or cream, and by keeping them well drenched with water there will be a gain in the sweetness of the supplies. I would strongly urge suppliers to send the milk and cream to their respective factories in filled cans, which will prevent the evils arising from jolting; but I would point out that this must only be done when the supplies are in a fresh condition. Milk that has become slightly acid should be sent unmixed with fresh sweet milk, and wherever possible, keep the morning and afternoon supply in separate vessels. In the case of cream, do not, under any consideration, mix quantities that have become advanced in acidity with a fresh sweet product. Send your consignments of cream to the factory of your district as frequently as you can.

Rule 8.—Purity of Drinking Water for Cows.

The freedom from impurities in drinking water is favourable to the production of sound-keeping milk; but, on the other hand, when animals receive quantities of tainted water, the milk suffers in consequence, and does not possess the same good properties. To avoid this danger, it is wise to provide a clean and pure supply, and to have the drinking troughs situated at a convenient distance to wherever the cows are grazing. If this is not done, the

cows will deny themselves their requirements of water when they are most in need, and this serious want will injure the milking qualities of the cows and encourage disease.

Rule 9.—Freedom of Taint-causing Weeds and Plants from the Food of Milking Stock.

In many districts close attention is required to reduce the overwhelming growth of destructive weeds, and, if possible, eradicate them from the land. The distribution of these unwelcome plants extends over a large area of country, and the bad influence is felt by stockowners as well as by the dairy farmer. In some parts of the State, I am told, the wild mustard, cress, and turnip flourish, and in certain months of our export trade, the injury to the flavour of butter is considerable. A strong effort should be made to effect a clearance of these troublesome plants, selecting the smallest paddock on the dairy farm to commence operations; and, where there is good natural pasture, a destruction of the flowering heads and stems should be made, thereby preventing the spread of matured seeds, which if left undisturbed would give rise to fresh plants on other parts of the farm. In cultivated crops, such as lucerne, rape, and cabbage, trouble frequently arises, but there is no reason why the milk should be tainted when ordinary precautions can be enforced. To prevent the occurrence of taint, lucerne and rape should be given to cows in small quantities, and, when fed immediately after cutting, it is recommended to mix the lucerne with dry fodder. In feeding cabbages, I would draw the attention of the suppliers to the possibilities of a bad flavour in the milk arising from the use of the stems, and to avoid risks I would suggest giving this food, as well as other of a taint-producing character already mentioned, to the cows after milking. The farmer's discretion is also required in the feeding of silage, trouble having occurred in some dairies to the milk supply from lack of sufficient care.

Rule 10.—Skill in Ripening Cream and Churning it into Butter.

It is not desirable to elaborate on the ripening of cream and the making of butter, as factory suppliers are not expected to pursue this branch of dairying on anything but a small scale. Notwithstanding this fact, much "cream-ripening" is done on the farm, and it is here that a grave error is permitted to continue to the detriment of the manufactured article, and to the injury of the farm manager, factory, and State. The reputation of our butter-makers is dependent upon the flavour of the produce, and this great quality in butter follows the care and skill that have been devoted to the ripening of the cream. Such a responsible duty should only be entrusted to our painstaking and trustworthy factory managers, who alone have the necessary equipment to control acid fermentation, and understand when to churn cream to obtain the best results in both quantity and quality of butter.

We have reached the most vital part in our paper, and all will agree that much is to be learned by suppliers in the way of collecting cream. The customary practice, and one that is attended with evil consequences, is to run cream from the separator into the same vessel twice daily until a sufficient quantity is obtained for conveyance to the factory. Again, in the case where the number of cows is small, cream consignments are kept too long on the farm, and it is common to find that morning and afternoon collections are not thoroughly stirred, leaving layers of old and fresh cream in one vessel. It would be to the advantage of the supplier to employ more vessels for this purpose, keeping them in a cool place, and, by thoroughly mixing the collections of cream in cans kept exclusively for that purpose the night previous to cartage to factory, fermentation would be better controlled and more evenly distributed, and a finer-flavoured and better-keeping butter would be produced. What is urgently wanted, I will again repeat, is more frequent attendance of the suppliers at the factories, and, if such were the case, the quality of cream would certainly reach a higher standard of excellence.

Rule 11.—The Use of Preservatives.

The use of powders sold for preserving dairy produce has become of very common occurrence. Of the compounds in the market some have marked preserving properties, and are useful only when employed in extreme cases; but it is well established that preservatives are added to milk and cream when a reasonable cause is absent. Suppliers are not aware of the injurious effects these so-called "harmless" salts and liquids exert on the value of milk for butter and cheese making, and in the case of preserved cream the butter manufactured never possesses the characteristics of the article made from a well-ripened product. To show how preservatives are used indiscriminately, I had analysed a sample of milk taken from a vat immediately before renneting, and found it to contain an exceedingly high percentage of boracic acid. The cheese made from the milk could not possibly be of good quality, proving that the practice is ruinous to the manufacturer. If suppliers carry out the recommendations given in this article, there will be little need for incurring the expense of preservatives, and the quality of our butter and milk will be further improved.

THE DAIRY HERD, QUEENSLAND AGRICULTURAL COLLEGE.
RETURNS FROM 1ST TO 30TH APRIL, 1904.

Name of Cow.	Breed.	Date of Calving.	Yield of Milk.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Annie Laurie	Ayrshire...	22 Nov., 1903	771	3·6	31·08	
Amy	"	26 Feb. "	156	4·2	7·33	Dry, 30-4-04
Annie	"	18 Feb., 1904	311	4·6	16·02	
Blanche	"	17 Oct., 1903	476	4·0	21·32	With first calf
Bonnie	"	19 Sept. "	465	3·2	16·66	
Blink	"	27 April "	697	3·9	30·44	
Cockey	"	22 Dec. "	592	4·0	26·63	With first calf
Lowla	"	3 Mar., 1904	902	3·8	38·38	
Leasome	"	27 Feb., 1903	563	4·4	37·74	
Lena	"	26 Feb. "	484	3·7	20·05	
Laverock	"	19 Aug. "	79	4·2	3·71	Dry, 17-4-04
Laura	"	3 Dec. "	643	3·8	27·36	
Linnet	"	3 Jan., 1904	809	4·5	40·77	
Lulu	"	26 Oct., 1903	515	3·6	20·76	With first calf
Luck	"	28 Nov. "	480	3·6	19·35	With first calf
Lottie	"	28 Aug. "	402	4·5	20·26	With first calf
Lightning	"	15 Jan., 1904	616	3·5	24·14	With first calf
Lonesome	"	10 Feb. "	603	3·7	24·98	
Lass	"	12 Mar. "	994	4·3	47·87	
Lavinia	"	26 Nov., 1903	646	3·5	25·32	
Renown	"	29 Feb., 1904	775	3·6	31·24	
Ream	"	15 Feb. "	633	3·8	26·94	
Ruth	"	15 Dec., 1903	632	4·6	32·56	
Realm	"	15 Dec. "	467	3·8	19·87	
Ruby	"	18 Jan., 1904	703	3·9	30·70	
Ream Routhi	"	3 April "	713	4·8	38·33	
Alice	Shorthorn	28 April, 1903	419	4·3	20·17	
Chocolate	"	17 Nov. "	525	4·1	25·22	With first calf
Cherry	"	2 Feb., 1904	720	3·4	27·81	
Dott	"	30 Sept., 1903	576	4·2	25·97	
Guinea	"	16 Nov. "	557	3·5	21·83	
Kathleen	"	15 Jan., 1904	532	3·5	20·87	With first calf
Kit	"	26 Mar. "	921	3·3	34·04	
Louisa	"	3 Jan., 1903	596	4·0	26·70	
Lady Vixen	"	16 Jan., 1904	763	3·3	28·20	
May	"	16 Dec., 1903	579	3·4	22·04	
Nestor	"	7 Jan., 1904	749	3·8	32·99	
Queenie	"	22 Mar. "	921	3·5	36·10	
Rose	"	21 July, 1903	364	4·9	19·97	
Tottie	"	11 July "	467	3·9	20·39	With first calf
Winnie	"	7 Oct. "	580	4·3	27·93	With first calf
Violet	"	7 April, 1904	464	3·9	20·26	
Horney	"	3 April "	668	4·8	35·91	
Gem	"	18 April "	270	4·4	12·29	With first calf

THE DAIRY HERD—continued.
RETURNS FROM 1ST TO 30TH APRIL, 1904.

Name of Cow.	Breed.	Date of Calving.	Yield of Milk.	Per cent. Butter Fat, Babcock Test.	Commercial Butter.	Remarks.
			Lb.		Lb.	
Bliss ...	Jersey ...	27 Feb.	567	4.8	30.48	With first calf
Connie ...	" ...	5 May, 1903	366	5.2	21.31	
Cocoa ...	" ...	17 Dec.	430	4.4	21.19	With first calf
Carrie ...	" ...	16 Jan., 1904	620	4.7	32.63	With first calf
Eileen ...	" ...	16 June, 1903	83	6.5	6.04	Dry, 18-4-04
Ivy ...	" ...	1 Jan., 1904	563	4.7	29.63	
Tiny ...	" ...	1 Dec., 1903	512	4.5	22.86	
Drone ...	Ayrshire Sh'rth'm	7 Oct.	474	4.5	23.88	
Haze ...	" ...	1 June	422	4.5	21.26	
Jeanie ...	" ...	6 Jan., 1904	744	4.0	33.33	
Madge ...	" ...	3 Jan.	464	3.8	19.74	With first calf
Mince ...	" ...	10 Jan.	494	4.0	22.13	With first calf
No. 46 ...	" ...	8 April, 1903	449	4.4	22.12	
No. 48 ...	" ...	4 Feb., 1904	790	3.0	26.54	
Nancy ...	" ...	12 May, 1903	67	4.4	3.30	Dry, 8-4-04
Nina ...	" ...	10 Feb., 1904	540	4.6	27.82	With first calf
Nada ...	" ...	18 Jan.	560	3.6	22.57	With first calf
Ping Pong ...	" ...	18 July, 1903	530	3.8	22.55	With first calf
Rita ...	" ...	17 Oct.	594	4.0	26.61	With first calf
Venus ...	" ...	13 Feb., 1904	493	4.7	25.95	
Lemon ...	Grade Shorthorn	19 July, 1903	451	3.5	17.67	
Lucy ...	" ...	18 Oct.	602	4.6	30.91	
Rosella ...	" ...	27 Feb., 1904	736	3.6	29.67	
Molly ...	" ...	19 Feb.	739	3.8	31.45	
Brindle ...	Jersey Shorthorn	16 Dec., 1903	576	4.7	30.32	
Mona ...	Holstein Sh'rth'm	8 Sept.	648	4.0	29.03	
Angel ...	Holstein Devon...	11 Mar., 1904	904	4.0	40.49	
Night ...	" ...	12 Aug., 1903	195	4.3	9.39	
Whitefoot ...	" ...	10 Aug.	450	4.8	24.19	
Reanie ...	Holstein Hereford	21 Sept.	632	4.4	31.14	
Donah ...	Holstein ...	2 Feb., 1904	601	3.8	25.57	With first calf
Damsel ...	" ...	3 April	797	3.9	34.81	
Fancy ...	South Coast	14 Oct., 1903	778	3.9	33.98	
Grace ...	" ...	28 Oct.	500	4.0	22.40	
Lady Rose ...	Guernsey	1 Feb., 1904	387	5.9	25.46	Slipped calf
Jersey Belle	Jersey ...	2 Mar.	648	4.5	32.65	
Princess ...	Shorthorn	6 Dec., 1903	525	3.4	19.99	
Rosebud ...	Ayrshire	27 Nov.	588	5.0	32.92	

The cows have all been fed on natural pastures only.

CLOSING OF A COW'S TEAT.

This may be caused by clots of casein, by some fungus growth inside, or by inflammation and thickening of the interior membranes of the teat. A metal dilator, such as Fig. 12, may be used effectively, or even a strip of spring wire bent in the middle may be inserted to open the teat and prevent further closing.



A milking tube is very convenient for use in affections of the teats. It may be a metal tube as shown in Fig. 13, or a small glass tube with smooth ends, a quill open at both ends, or a small rubber tube. If all other devices fail to open the teat enough, the most certain method is to use a teat-cutter containing a fine cutting blade in the upper end, which can be sheathed while the instrument is being inserted, and then opened ready for cutting downward as it is pulled out. This should be followed by keeping the cut canal open with a spring dilator or a lead probe until it heals.—*Station, Farm, and Garden.*

Tropical Industries.

THRESHING COTTON.

Mark Twain, when agricultural editor of a rural journal, advised that the best way to gather pumpkins was to climb the tree and pick them carefully. On a par with this would appear to be the idea of utilising a wheat-threshing machine for threshing cotton. But this extraordinary method of harvesting a cotton crop appears to have been actually done, and even to be a regular thing, in the Red River County, U.S.A., as will be seen by the following extract from that most reliable journal, the *Florida Agriculturist*:—

THRESHING COTTON.

This seems to be a strange proposition, yet the *Dallas News* quotes from the *Clarksville Times*:—

It has been demonstrated that the matured but unopened cotton bolls can be gathered from the stalks, run through a threshing machine, ginned, and the product sold at a handsome profit. There are 5,000 bales of unopened cotton in Red River County worth \$40 a bale after being threshed. The bolls are easily gathered, and the profit is apparent. Nearly every man can add one or more bales to his crop by gathering these bolls instead of letting the cows have them. Bob Sively, the Clarksville ginner, has announced his willingness to put in the machine at once if there is sufficient demand for it. This is no "pipe dream," but a demonstrated fact. Farmers in many counties are threshing their bolls, and if it pays them it will pay others.

On this the editor of the *Dallas News* comments as follows:—

It is said that necessity is the mother of invention. It would seem that high prices also quicken the mind. Had it not been for the price paid for cotton this year, the bolls unopen, but susceptible of being made valuable, would have remained in the fields as they have always remained there. Down in East Fork Bottoms, on a convict farm, the overseer cut bushy trees, and had them dragged over the half-opened bolls, and thus secured many bales of cotton which would never have been gathered. It was a primitive way, and not up to the process of threshing the bolls, but the simple process yielded many dollars. Hereafter, if cotton is worth the picking, the bolls which have cotton on them after the frost falls will be subjected to the thresher. Someone may come forward and point to this new way of gathering cotton as another benefit the boll weevil has done the country. For if it had not been for the high price the resort to the thresher would not have been adopted, and if it had not been for the boll weevil the price would not have been so high.

On the same subject, the *Forney Headlight* says that 250 bales of cotton have been threshed at that place, while several carloads of bolls have been shipped from points where there is no threshing machinery. It estimates that \$10,000 worth of cotton has been saved in this way. A pretty nice pick-up!

Threshing machines are not always available in a cotton-growing country. Yet some have devised a way to save the unopened cotton. The *Farm and Ranch*, another Texas paper, tells the story as follows:—

Cotton-picking in the house is a novel experience, but it may be carried on with profit when high prices prevail. This has been demonstrated by Mrs. R. J. Powell, R.F.D. No. 5, Dallas, Texas, who marketed two and three-fourths bales of cotton early in February for 13 cents per lb. Last fall Mrs. Powell determined to save her late cotton crop, which was threatened by cold weather before it opened sufficiently for picking. The green bolls were gathered, and placed in a room in which there was a fireplace. Artificial heat was applied to

the bolls, which were stirred from time to time, and in December they had opened sufficiently for picking. Mrs. Powell's three children picked the cotton after school hours, and frequently worked by lamplight. There was therefore no extra expense for labour. Care was taken to keep the picked cotton free from trash, with the result that it brought a good price when placed on the market. Mrs. Powell's success was so marked that some of her neighbours purchased bolls from near-by fields after stalks had been killed by cold weather, and resorted to the home-picking process. One farmer paid \$9 for all the bolls he could gather in an abandoned field, and cleared \$91 by the transaction.

This is strong evidence, which tends to show that hand-picked cotton even from immature bolls is of a higher grade than the threshed article. During the past season it was profitable to market cotton in almost any condition, but it is doubtful if such would be the case if the price should fall below the 10-cent mark. It has been demonstrated that cotton matures before bursting the boll, and may be as useful as staple gathered under usual conditions.

COTTON-GROWING IN QUEENSLAND.

An anonymous correspondent of the *Brisbane Courier*, writing on 22nd April on the above subject, whilst showing his doubts about the knowledge of the subject possessed by officers of the Agricultural Department, yet has, in spite of his criticisms on the writings of Messrs. D. Jones, A. J. B., and "Koradji," done more to serve the interests of the cotton industry than all the other writers on cotton-growing. He supplies most valuable and interesting information as to the results of the experiments carried out by Messrs. A. Eldridge and Poole, which we here republish. "Old Colonist" could not have done greater service to the promoters of the revival of the industry had he published reams of instructions to intending planters. The following letters, &c., with which he concludes his letter will be read with great interest:—

COTTON CULTIVATION.

To the Editor of the Moreton Bay Courier.

Sir,—As my crop of Sea Island cotton is now off the ground, and nearly all the proceeds in my pocket, I avail myself of this opportunity to make known to my neighbours the results of my experiment, trusting that some allowance will be made for one who, hitherto, was unacquainted with agricultural pursuits generally, and much more so with this particular branch of it:—

The quantity of land cultivated was 5 acres, and the seed was planted in the latter part of October, 1852.

Expenses paid as follows:—

Breaking up and preparing the land for seed ...	£12	10	0
Planting and keeping the ground free from weeds	10	0	0
Gathering 2,500 lb. of seed cotton, at 1d. per lb.	10	8	4
Drying, packing, and carrying to market, bales, &c.	5	0	0
	£37 18 4		

2,500 lb. cotton in seed £52 1 8

No mention has yet been made of the cost of the land, as that may vary much in different localities in this district, but I have no doubt that part of the expenses can be easily ascertained.

When I commenced planting the above ground some difference of opinion existed as to the description of land best suited to the cotton plant, but as the greater part of the ground in which the cotton was grown was poor, gravelly soil, apparently fit for nothing but vines, I have no hesitation in saying, from

the superiority of the plants in the better part of it, that the cotton plant will do better in a rich than a poor soil.

I would further add that the planting having been delayed till the latter part of October the young plants had nearly all the summer heat, and also at least a month's dry weather—and which threw the harvest to such a late season (May and June) that the frost destroyed fully half the cotton before it could be picked.

The item of picking at 1d. per lb. may appear excessive, but, owing to my inexperience in the usual pruning and topping the plants, that operation became very tedious, yet I have no doubt I shall be able to do it at half the cost next year.

In conclusion, I beg to remind you that this experiment has been made during the gold mania, when labour and all other expenses have been higher than usual, and, as the first year is not expected to pay much profit beyond growing a good tree for future seasons, I imagine this experiment has not been an unsuccessful one; in fact, so much confidence do I feel in the capabilities of this district to produce the great staple in quantity to pay well the grower, that I have taken some extra trouble to prepare my trees for the coming season, when I hope to have the pleasure of showing you a different sum altogether to the credit of the cotton field.—I am, sir, &c.,

Brisbane, 29th September, 1853.

AMBROSE ELDRIDGE.

Extracts from *Moreton Bay Courier*, 3rd October, 1853.—“Twenty-one bales and eighteen bags of Moreton Bay cotton were shipped by J. and G. Harris to England, the greater part having been grown by Mr. A. Eldridge and the late Mr. Poole.”

14th January, 1854. *Moreton Bay Cotton*.—“Of the cotton grown on the Brisbane River, and purchased by Mr. John Harris for the London market, eighteen bales were shipped from Sydney in the ‘Great Britain,’ and eight more would go in the ‘Vimiera,’ by which ship Mr. Harris proceeds to England. The average weight of the bales was 600 lb.”

The above letters are most interesting and instructive, viewed from the standpoint of the present conditions under which agriculture is carried on, and hence they should not be buried in oblivion.

“Old Colonist” further says:—“Some correspondents unanimously assert that the first planting of cotton was in 1862, but why do they ignore the initiatory and most interesting era of the industry between 1852 and 1862? It can be shown beyond question that the first experiment was made in 1852, when a portion of what is now the Milton Estate (at that time the property of the late Mr. Ambrose Eldridge) was a cotton field. In 1853 and succeeding years the frontage on the south side of the Brisbane River between Messrs. A. and J. Carmichael's saw-mills and the South Brisbane Cemetery was under crops, principally cotton, and at several places on the river many acres of cotton were grown. The experiments of those days were made when there were no improved implements such as are available nowadays; no compulsory education; no eight-hour day or minimum wage; no Department of Agriculture, with its official journal to guide, or possibly in some cases, misguide; no cotton gins to clean the crops; no bonus to encourage the growers; and only one purchaser of the crops when grown.

“To the late Mr. Ambrose Eldridge must be given the credit for his enterprise in making the first experiment in cotton-growing in what is now Queensland, but was at that time known as Moreton Bay, a part of New South Wales. Closely following Mr. Eldridge were several others, prominent amongst whom for his enthusiasm was the late Mr. George Poole. Both of these gentlemen were Brisbane chemists, who took great interest in public matters. Mr. John Harris was the first buyer and shipper of cotton from Brisbane, and the first cotton gin seen in Brisbane was made by Mr. David Longlands, of the Public Works Department.”

If the late Mr. Eldridge had been able to plant his cotton under the present favourable conditions—*i.e.*, on land under ordinary cultivation and needing only one ploughing—he would have probably had 5,000 lb. instead of 2,500 lb. of seed cotton. He obtained 5d. per lb. (it was Sea Island, not Uplands) for 2,500 lb., and thus made a profit of £14 3s. 4d. on 5 acres, or at the rate of £2 16s. 8d. per acre. Had he had an ordinary crop of 5,000 lb. of seed cotton, his profit would have been about £11 per acre. But to-day the cost of picking would be only one-half of the price paid by Mr. Eldridge, so that, instead of £20 16s. 8d., this item would be reduced to £10 8s. 4d., which would have given him another £2 per acre profit. Can anything be more convincing that Queensland is a country well adapted to cotton-growing? Those who remember the time when South Brisbane was mainly bush will also recollect how poor and gravelly the soil was, and still is, where not made artificially by manure. It was on such soil that these returns were got. What should they not be on such soils as those of West Moreton, the Central, and North-western districts?

COTTON.

There appears to be every probability of cotton-growing being taken up in earnest in Queensland in the coming season. Hence it is well to have information on the subject from all sources. We reprint from the *Bulletin of the Department of Agriculture of Jamaica* the following interesting report of a conference on cotton, held at the Institute, Kingston, Jamaica, on 12th November last:—

A Conference on Cotton was held at the Institute, Kingston, on the 12th November, and Sir D. Morris, who was on his way back from the United States, kindly gave an address embodying in its short compass the information that he had been able to acquire in his travels through the Sea Island cotton districts.

On Sir D. Morris's arrival in Barbados, a Cotton Conference was held on 11th December, for the purpose of learning the results of his visit to the States, and his address, containing fuller information, is published below.

It will interest many to have a statement of actual expenditure for the cultivation of cotton in Jamaica in the year 1842, and this is reprinted from the "Votes of the House of Assembly."

Instructions for planting cotton are added.

COTTON CONFERENCE.*

Sir Daniel Morris said:—This meeting has been called a conference because I prefer to meet the planters in conference for the mutual exchange of ideas and of information with regard to the matter that we have in hand. As you are aware, ever since the Imperial Department of Agriculture was established in the West Indies the desire of every member of that department has been to come into close contact with the planters in all parts of the West Indies. We wish to work in harmony and sympathy with those gentlemen, and we are glad to have an opportunity like the present, when we can obtain their views and ideas, and ascertain what are the particular difficulties they have to contend with. We fully realise that in every department of agriculture there are numerous difficulties that have to be overcome, or else we cannot reap the fruits of our labours. Now with regard to the question of establishing a

COTTON INDUSTRY.

The first time I brought the matter before the planting community in the West Indies was at a meeting held in Barbados in February last. I then gave as much information as I possibly could, and promised to give all the assistance in my power. In response, a large number of planters have taken up the cultivation of cotton, and done the very best they could under trying circumstances to-

* The *Barbados Advocate*, 19th December, 1903.

make the experiment a success. When we had decided that the Sea Island cotton was the particular variety suitable for cultivation, I obtained permission from the Secretary of State for the Colonies to pay a visit to the Sea Island cotton districts of the Southern United States, in order to place the planters in as favourable a position as possible. The Secretary of State for the Colonies also gave permission for Mr. Bovell to accompany me, in order that he might obtain at first hand all possible information as regards the industry, so as to be able to help local cotton-growers in any difficulties that they would have to contend with.

TRIP TO THE UNITED STATES.

We left for the United States about the middle of September last. We spent some time in New York making inquiries about molasses, and then we found our way to the Sea Islands. We were most kindly received there by the planters, who took us over their plantations and ginning-houses, and gave us all possible information about the industry. We were also accompanied by an officer of the United States Department of Agriculture, who took us over certain estates and experiments carried on by the department. I hope it is understood that I am not going to speak about the general cotton belt of the Southern States of America, but about

SEA ISLAND COTTON.

The Sea Island cotton is confined practically to three States—South Carolina, Georgia, and parts of Florida. That cotton was first obtained from the West Indies, and was obtained by a Governor of South Carolina, and has since been cultivated in that State and also in the two other States I have mentioned with great success. Under the stress of circumstances in the West Indies we are anxious to obtain another industry, and one industry that we are trying to establish is that of Sea Island cotton. In order to thoroughly understand the circumstances of that industry, we cannot have a better object-lesson than what is done in the Southern States of America. On the plantations Mr. Bovell and I visited there was not a very large area cultivated by any one planter. On only one of the plantations that we visited did we see as much as 100 acres under cotton at one time. That was due in the first place to the difficulty experienced in getting labour. In order to get labour, proprietors have to give a certain area, free of rent, for so many days' work on their plantations. Usually the labourer obtains about 5 acres of land for two days' labour a week. If additional labour is required it has to be paid for at the rate of 50 cents a day, and a certain number of persons are employed at a wage of \$10 a month and have rations found them. The conditions are rather difficult for the planters owing to the indifferent character of the labour; it is expensive labour, and even at that is not quite satisfactory. It may be said that the planters of the Sea Island cotton districts have many difficulties to contend with that we have not in the West Indies. As regards the characteristics of the plantations, we visited several on James Island, and found cultivation carried out in a careful and systematic manner. I am referring now to the plantations owned by white planters who look after them personally and live on them. The cotton seed is sown in April, the plant begins to flower in August, and picking takes place during the months of September, October, and November. We were there in the middle of the crop time, and saw the people gathering the cotton, saw them bringing it in, spreading it out to dry, and saw it put through the gins. We examined the gins very carefully, and satisfied ourselves as to some of the difficulties to be met with.

POSITION OF WEST INDIES AND SOUTHERN STATES.

Taking all the circumstances connected with cotton cultivation in the two places, I am of opinion the West Indies are better placed than the Southern States of America. We have our own difficulties, I admit, and the severe lesson we have had this year with regard to the caterpillar is sufficient to discourage

the weak-hearted, but it should not be sufficient to discourage those who are possessed of courage and are prepared to put their intelligence, energy, and all available appliances to work in keeping the plant as free from disease as possible. We were told on every plantation we visited in the Southern States that so far as the caterpillar worm is concerned there is no need for anxiety about it. If taken in time, it can be easily dealt with.

QUALITY OF OUR COTTON.

With regard to the cotton grown here, it has been shown from the samples recently sent to England that it is quite as good as the average cotton grown in the Southern States of America. As you are aware, the price of Sea Island cotton is much higher now than it was some time ago; and we have been assured by the British Cotton Growers' Association that if we can establish the cotton industry and turn out cotton as good as the samples recently sent to England there is no reason why we should not make a fair profit. I shall not discuss the question of cultivation to-day. I hold in my hand a copy of the *West Indian Bulletin*, which has just been posted to its readers, and will be in their hands this evening. This number is devoted entirely to the cotton industry, and contains all information available up to September last. In it are fully discussed the origin and distribution of Sea Island cotton and its cultivation. Then there is an article by Professor d'Albuquerque on the chemistry of cotton. There is also a paper by Mr. Lewton-Brain on fungoid diseases of cotton, and another by Mr. Ballou with illustrations on insects attacking cotton in the West Indies. So that you have in the 90 pages of which the journal is comprised all the information about cotton up to September last. We promise you in addition that the results of our visit to the United States will be published in a special number of the *Bulletin* which will be out during the next two or three weeks. Therefore, I can say that you are in possession of the fullest information it is possible for us to give you on the subject.

PICKING COTTON.

Cotton should not be picked until the bolls are fully open and the boll-lobes slightly fluffy. In South Carolina cotton is usually picked by women and children, who carry bags, 2 feet long by 18 inches wide, suspended round their necks, to put the cotton in. As soon as the bags are full, they are emptied on osnaburg sheets, 2 yards square. When there is sufficient cotton on these sheets they are folded across and the opposite corners tied together. The cotton is then weighed and loaded on carts to be taken to the factory. Picking cotton is paid for by weight. The operation requires a little practice, but the picker soon learns the knack of extracting the contents of the bolls. An adult picker, who is expert at the work, picks from 100 to 150 lb. of seed cotton per day. Children of twelve years old pick from 20 to 30 lb. per day.

DRYING COTTON AND PREPARING IT FOR THE GINS.

After the cotton is taken to the storeroom, it is examined by the pickers, who take out all bits of bolls, pieces of leaves, &c. The cotton is then spread on platforms or arbours to dry. After it is sufficiently dried, it is assorted and whipped. Assorting cotton is taking out with great care all immature and stained bolls, bits of leaf, and motes. Whipping cotton is striking handfuls of the seed cotton with a whipping motion on a mesh galvanised iron wire netting strained over a frame, 3 feet long, 2 feet wide, and 6 inches deep. During this operation the boll-lobes are more fully opened, and any extraneous matter, such as particles of soil, sand, &c., pass through the meshes. Whippers should prepare 300 lb. of cotton per day.

When the cotton is not properly prepared before it is sent to the ginneries, a charge of \$3 per 1,200 lb. of seed cotton is made for picking, assorting, and whipping it. After the cotton has been dried and prepared, it is allowed to

remain some time before it is ginned, in order that the lint may absorb a little of the oil from the seed. It is thought that this adds to the silky lustre of the fibre.

In James Island, where there are comparatively small factories (but all driven by steam), as soon as the cotton is made ready to be ginned by assorting and whipping as described, it is tied up in osnaburg sheets 3 yards square and sent to the ginners. On the mainland, where there are large ginneries operating about thirty gins, the cotton is usually conveyed from the plantations to the factories in closed railway trucks. From these the cotton is drawn up to the top story of the factory through large tubes, from which the air is exhausted by means of a revolving fan.

GINNING.

On the arrival of the cotton at the factory it is weighed and hoisted to the top story of the building, known as the cotton-loft. The cotton is then fed into shoots, which pass through the floor just over each gin. While the cotton is being put into the shoots, the women or boys in charge remove any bits of leaves which may have escaped the pickers and assorters. The object of feeding the cotton to the gins through these shoots is that in case of fire it is not readily ignited. From the shoots the cotton is fed to the gins as required. Behind each gin there is an endless band or conveyer about 5 feet long, on which the lint falls as it comes from the gin. On each side of this conveyer a woman stands to pick out any notes which may still have passed through the gin with the lint. Any bits of leaves or stained cotton which may have escaped the pickers, assorters, and shoot-fillers are also picked out at the same time. These conveyers, it may be mentioned, are driven by belting from the main shaft.

The lint, which should now be quite white and free from impurities, is taken to the baling-room. Care is taken to remove the lint from the neighbourhood of the gins as fast as possible, in order that in case of fire there is very little of it to burn.

GINS.

The best gins for long-staple cotton almost universally used in the Sea Islands are McCarthy Single Action Single Roller Gins, made by Messrs. Platt Bros., Messrs. Dobson and Barlow, and Messrs. Lee, of Oldham, Lancashire. These gins are, however, modified after being received to suit local requirements. A specimen gin so modified is now at the Central Cotton Factory, at Bridgetown. The gins should be firmly placed on a solid masonry foundation, and be quite level. In the Sea Islands they are usually placed on thick brick walls.

In setting a gin ready for working, the following points should be carefully attended to:—First, the leather-covered roller should be exactly parallel to the frame carrying the "doctor" knife. Then the bevelled edge of the doctor knife should be placed against the roller, and in such a position that the edge of the bevel presses a little more on the roller than the heel. The edge of the doctor knife ought to be opposite the centre of the roller or slightly above it.

The beater should then be set so as to pass the edge of the doctor knife $\frac{1}{8}$ -inch on its upward stroke, and the same distance on its downward stroke. In other words, the length of the stroke of the beater ought to be $1\frac{5}{8}$ inches. This will allow sufficient space for the cotton to come in contact with the roller. In many instances the beater shaft is raised higher than when sent out from England, so that the arc formed by the beater is equi-distant from the roller when at its highest and lowest points and nearest to the doctor knife when passing its edge.

The spiral grooves of the roller should not be more than $\frac{1}{16}$ -inch deep, and should all be on the edge of the flesh side of the walrus hide. Care should be taken to see that the roller has been turned true, and that it is always the same distance away from the doctor knife along the whole of its length. The

leather on the roller usually remains in good condition for sufficient time to clean about 100 to 125 bales of lint. After that period it will probably require to be renewed. An extra roller should always be ordered with each gin, so that the work of ginning may not be interrupted. The rollers are covered with a specially prepared walrus hide. This is said to cost in London about 3s. per lb. It requires 18 lb. to cover a single roller. During the present season it will probably be found more convenient to order extra rollers from the makers than attempt to cover them in the West Indies. On many of the gins in use in the Sea Islands a brush is adjusted in place of the wooden or iron bar which hangs against the back of the roller to prevent the lint from being carried round with the roller, and so causing what is known as "back lashing." The latter, if not immediately attended to, may cause the doctor knife to be forced outward until it comes in collision with the beater. The brush is attached to the frame of the conveyer behind the gin, and fixed in position with a thumb-screw and slotted angle iron, so that it can be properly adjusted. Before the gins are used "links" (or connecting rods attached to the beaters) of a different construction are often substituted for those sent with them.

In almost every instance the gins are driven by two belts, one driving the roller from about 140 to 175 revolutions per minute, and the other the beater at the rate of from 850 to 900 revolutions per minute. *The longer the staple the slower the roller ought to turn, so as not to break the fibre.*

FIRES.

Owing to cotton being very inflammable, fires sometimes occur in the factories, and many precautions are taken to prevent it spreading. Some of the buildings are lined with tin or galvanised iron; others have the insides of the factories painted with fireproof paint. In some instances it was observed that a pipe from the boiler entered the ginning-room, and in case of fire all windows and doors were immediately closed and the room filled with steam. In most factories buckets of water, containing an osnaburg sheet soaked in them, were suspended by each gin, so that, in the event of the lint taking fire, the wet sheet could at once be thrown over the flames. At all the best factories water under pressure is laid on with a hose always ready for use.

BALING.

From the ginning-room the lint is taken to the baling-press, which is sometimes in a separate room. For Sea Island cotton the press is entirely different from that used for Upland cotton. In the Sea Islands it is usually worked by hand. In one large ginney in Georgia it was observed to be worked by steam. The construction of the hand-power press in which the lint is pressed into a large sack by a plunger is as follows:—The upper portion of the press, which contains the rack and pinions for raising and depressing the plunger, rests on the floor. Just beneath the plunger a hole is cut in the floor, slightly smaller than the size of the bale. In this hole the top end of the bale-bag is passed and tacked around an iron ring, slightly larger than the hole, which thus keeps the top of the bag suspended. Underneath the bale-bag on which it just rests there is a platform suspended by four iron rods from the base of the press. This platform can be lowered or raised by means of nuts with handles working on threads run for some distance on the rods. The bale-bags, which are $7\frac{1}{2}$ feet long, are made of Dundee sacking. Two qualities of this sacking are used—one which weighs 2 lb. per yard, and the other, which is thicker, $2\frac{1}{2}$ lb. per yard.

As soon as the bale-bag is filled to about one-third of its length, the plunger is lowered into the bag, and the lint pressed. The plunger is then allowed to remain in the bag on the lint until the next lot is ready, when it is withdrawn, and the lint inserted. This operation is continued until the bag is full, when it weighs about 400 lb. Before the bag is put into position to receive the lint, a handful of cotton is put into each corner at the bottom, and an "ear" made, so that in lifting the bale the workmen have something to hold by.

"Ears" are also made at the corners of the bag when the bale is being sewed up.

A Sea Island bale of cotton when ready for shipment is a long cylindrical body with four ears (two at each end) resembling a "pocket" of hops. There are no bands or hoops. The stitching along the side and ends of the bag should be strong enough to bear all the pressure considered desirable to apply to the best sorts of Sea Island cotton.

TO ESTIMATE THE YIELD OF COTTON LINT PER ACRE.

In the Sea Islands the yield of lint is estimated from the number of bolls on the plants. The bolls on a number of plants of average size are reckoned, and the average obtained. For every 15 bolls, where the plants are in rows 5 feet apart and 20 inches apart in the rows, the yield is usually about 100 lb. of lint per acre. Of course this varies slightly with the variety of cotton and with the yield of lint per 100 lb. of seed cotton. On the average 300 lb. of lint is obtained from 1,100 lb. of seed cotton. Sometimes, however, where the variety has large seeds, and where the seed cotton has been kept for an unusually long time, as much as 1,500 is required to yield 300 lb. of lint.

COST OF GINNING.

The cost of ginning cotton in the Sea Islands is usually from 3 to 4 cents per lb. of lint, the ginner supplying all baling material free of cost. As already mentioned, if the seed cotton is not already picked over, whipped, and assorted before it is sent to be ginned, an extra charge at the rate of \$3 for every 1,200 lb. of seed cotton is made by the ginner. This is a matter that deserves to be carefully borne in mind by cotton-growers in the West Indies. If the seed cotton is not properly prepared beforehand, it will be impossible for the ginning factory to clean and bale it satisfactorily at a cost of 3 to 4 cents per lb. of lint.

DISEASES OF COTTON.

In the United States there are several very destructive diseases affecting cotton. Among the most dreaded of these is the Mexican boll worm. This has not reached the eastern portions of the cotton belt. It has been reported from Cuba, and on that account it is undesirable that any cotton seed, or indeed any portion of the cotton plant, should be introduced from that island into the West Indies. A disease known as "wilt" or "Frenching" affects Sea Island cotton in Carolina, Georgia, and Florida. It is being kept in check by raising varieties resistant to this disease. Neither the Mexican boll worm nor the wilt have so far been observed in the West Indies. I was careful from the first to point out that we could not hope to grow cotton here without having to deal with disease of some kind. In February last it was stated in the *Agricultural News* (Vol. II., p. 50):—"Pests will appear wherever cotton is grown, and they should be looked for, and at once dealt with. If pests are expected as part of the regular routine of cultivation, they are less likely to be feared." Again, in the *Agricultural News* (Vol. II., p. 242) there appeared the following:—"Finally, we would repeat what we have already impressed upon the planters—viz., that they should keep a watchful eye for insect and fungoid pests, and *immediately* communicate specimens and seek the advice and assistance of the officers of the Imperial Department of Agriculture."

Among the pests that have troubled cotton at Barbados this year the most widely spread and destructive has been the caterpillar or worm of a moth (specimens of which are on exhibition in the hall) known as *Aletia*. The attack of this was so sudden and severe that the damage was done before the planters had realised what was going on. There was also the drawback that there was only a small supply of Paris green in the island. The life-history of the insect is well known, and it is fully given in the current number of the *West Indian Bulletin* (pp. 268-271). I am of opinion that if a keen lookout be kept for this

cotton worm in September and October of each year, and immediate steps be taken to deal with it as advised by the officers of the Department, there is every probability that it can be effectually kept in check.

In the United States, where it is equally abundant if not promptly dealt with, the planters do not regard it as troublesome. They treat it when the worm is only about an eighth or a quarter of an inch in length; and one or two dustings with Paris green and lime in the proportion of 1 to 6 are sufficient to get rid of it.

We must recognise that at Barbados, with practically the whole of the available land under constant cultivation, and with a dense population, the conditions, from the agricultural point of view, are becoming more and more artificial. The fight with pests must be accepted as inevitable; and it is only by intelligent and energetic action on the part of all members of the planting community that we can hope to raise large and remunerative crops. We might assist in placing matters in a more natural condition by planting trees on all waste areas, and by encouraging birds, lizards, and all insectivorous members of our fauna. If we had large areas under trees, our climate would be moister and less liable to suffer from severe spells of dry weather; and if we had double or treble the quantity of insectivorous birds we have at present, our conditions as regards some pests at all events would be greatly improved.

Besides the cotton worm, there are several fungoid diseases causing blight on leaves and pods. It has been noticed that these are more prevalent on ratoons than on plants. At present it is inadvisable to attempt to raise any ratoon crops of cotton. After this year's crop is reaped, it would be better to get rid of everything, and make an entirely fresh start next year. After a careful review of all the circumstances, and after visiting most of the areas planted with cotton this year, I am convinced that, with thoroughly intelligent and active treatment of the cotton worm and other pests, no insuperable difficulty has yet presented itself in the way of establishing a successful cotton industry in this island.

COTTON SEED FOR PLANTING IN 1904.

There are several sorts of cotton being grown experimentally this year. Owing to the risk of crossing, it is recommended that an entirely fresh supply of the best seed be secured for planting next year. They begin planting cotton in the States in April. The planting season in the West Indies is from June to August. If, therefore, immediate steps are not taken to secure seed of the best Sea Island cotton in advance of the States, the West Indies will have to put up with inferior sorts. With the view of securing beforehand a large supply of seed of the best Sea Island cotton for these colonies, during my recent visit I obtained the refusal of all the seed produced on one of the most successful plantations on the seaboard of South Carolina. On this plantation the proprietor has for several years carried on experiments with the United States Department of Agriculture in raising disease-resistant varieties as described in the *West Indian Bulletin* (Vol. IV., pp. 201-214). The lint is of fine quality, and has uniformly obtained the highest prices. The seed will be carefully cleaned and sorted, and will be delivered with a guarantee that it is the product of this plantation and no other. It is estimated, as already announced on p. 379 of the *Agricultural News*, "that this seed will cost, delivered to the planters in the West Indies, about 7 cents per lb. (or at the rate of 1s. 9d. per acre), and, as it will have to be paid for when ordered, those requiring it should note that it must be paid for in advance." The date for closing orders for this seed has now been extended until 4th January, 1904. After that date, the Department will be unable to procure any further supplies of this selected Sea Island cotton seed. It will, however, continue to assist in obtaining other seed; but the latter may not be of so good a quality, and it may cost more. The importance of selecting good cotton seed is very emphatically dealt with by Mr. Herbert J. Webber, physiologist in charge of the plant-breeding laboratory connected with the United States Department of Agriculture:—"As well

might the breeder of fast trotting horses introduce dray animals into his stables, or the breeder of intelligent hunting dogs introduce ordinary mongrel curs into his kennels. The use of good seed and its production by a regular system of selection are just as important factors in the production of the crops as that of cultivation. No intelligent method of farm management disregards the production and use of good seed. The day when growers can afford to plant any sort of cotton seed has passed. Only seed of a known variety, selected because of its desirable qualities and adaptability to local conditions, should be planted."

In answer to questions put to him, Sir Daniel Morris said he would not advise anyone to ratoon cotton this year owing to the presence of disease. Where the worms destroyed the middle part of the plant, and it was the wish of the grower to obtain a crop, he should cut off the top below the diseased portions in order that the shoots might come up. The present crop would not have been so advanced had it not been for the dry weather which prevailed in November. What they wanted was for the crop to be in such a state that it could be reaped during January, February, and March. He did not think Peruvian cotton was likely to suit us, because it was a perennial plant. What was required in this island was a short-season cotton, one of 5 or 6 feet in height, with large branches. With regard to wild cotton, he did not think it was likely to be dangerous to Sea Island cotton unless it were allowed to grow to windward of such cotton, when its pollen would be easily carried into the field. He thought growers were delaying too long the picking of cotton that was fit to be picked. The best thing would be to pick it every two or three days—at least twice a week. The capsules of the Sea Island cotton did not open so much as the Peruvian cotton, and that was one difficulty in picking it. Directly the capsules were open to such an extent that one's fingers could get inside, the cotton should be removed. He believed that one danger of leaving the cotton too long before it was picked was, that it might attract the attention of some animal which might develop an appetite for it.

CULTIVATION IN JAMAICA IN 1842.*

Examination taken before the Committee to whom was referred the Petition of Henry Gourgues.

Wednesday, 14th December, 1842.

Examination of Henry Gourgues.

Question.—Have you at any time raised cotton in this island? If so, state where, when, and to what extent?

Answer.—I have raised cotton in Liguanea, in St. Andrew, in the year 1841, to the extent of 10,000 lb. weight.

Q.—At what cost have you raised cotton per acre, and what amount has an acre of land cultivated in cotton yielded?

A.—The cost of cultivation will be shown by the following statement of expenses incurred in establishing 10½ acres of land in cotton, and the returns therefrom in one year:—

	£	s.	d.
Labourers, cleaning, digging stumps, &c	9	3	10
Digging holes and planting	11	6	6
Weeding four times during the year, job-work, at 12s. per acre each time	25	16	0
Picking off the trees 30,000 weight of seed cotton, at 1s. for every 40 lb. (task work)	37	10	0
Four labourers, ginning 110 lb. of clean cotton daily, at 1s. 6d. each per day, equal to 6s. for every such 110 lb. ...	27	5	10
One dozen osnaburg bags for picking cotton in the field ...	0	14	0
221 yards of bagging, 38 inches wide, at 7½d. per yard, each bale of 300 lb. taking 6½ yards—£6 18s. 1d.; twine, 16s.	7	14	1
	£119	10	3

* Reprinted from the "Votes of the House of Assembly."

Cr.

By 8,000 weight of clean cotton at 6d. per lb.

net	£200	0	0
2,000 ditto, stained ditto, at 4d.	33	6	8
	<hr/>		
		233	6 8
Gain	£113	16	5

Equal to £11 per acre.

Next crop I must expect double the quantity of cotton, the trees being older, and bearing more fruit. It is well known that the perennial cotton-tree seldom produces a full crop before the second year of its growth, but, estimating the crop at only 18,000 weight, the result will be as under:—

	£	s.	d.
Cleaning field twice a year	12	18	0
Pruning once, £6 12s.; picking, at 1s. for every 40 lb., £67 10s.	74	2	0
Ginning, 6s. for every 110 lb.	49	2	6
Bagging, £12 3s. 9d.; twine, 25s.	13	8	9
	<hr/>		
	£149	11	3
Estimated crop of 18,000 weight at 6d. net	450	0	0
	<hr/>		
Gain	£300	8	9

Equal to £30 per acre.

Q.—State the mode of cultivation adopted by you in detail?

A.—I beg to lay before the Committee the following statement, which will afford the information required. I planted my cotton the end of April, 1841, and the crop commenced in September, and finished in December; consequently, about five months after planting I commenced picking. The blossoms appeared the end of July and beginning of August; the pods opened six weeks after the blossom appeared. All the pods are not developed at the same time, but gradually, so that a field has to be gone over several times before the whole crop is taken off. The crop which is picked between September and December runs great risk of being damaged or stained by the October rains. The parcel mentioned in my statement as stained was damaged during that time, and, as I could get no labourers to work continuously then, I lost a good deal of cotton, which was washed away by the heavy rains. The same risk does not attend the second crop, as it is picked between February and April, before the May seasons set in. I employed women to collect the cotton, as they were more expert at it than the men; they would frequently pick more than their task, but the men not one-half. The task is 40 lb. a day of seed cotton for 1s., but in a large field I am certain they could pick double that quantity with ease. It is seldom that the perennial cotton-tree produces a full crop before the second year of its growth, as I am informed; consequently I have every reason to expect a much larger quantity of cotton from my field next year from the favourable appearance of the trees, which are now covered with pods. I consider this information correct.

Q.—How many years do the cotton-trees continue to grow, and produce cotton, so as to render the cultivation profitable?

A.—The perennial cotton lasts five years, and the other description of cotton lasts but for one year.

Q.—Have you commenced picking your present crop, and what was the description of seed which you used?

A.—I shall not be ready for picking until February next. The seed that is used is the seed of the Sea Island cotton.

Q.—Are you extending your field?

A.—Not yet, but I am anxious to extend it, under the conviction that it will be profitable.

Q.—Does your present field look promising?

A.—Beautiful. The land is composed of hard, dry clay, and sandy soil.

Q.—Are you aware of any person competing with you in the rearing of cotton.

A.—No one, to my knowledge.

INSTRUCTIONS FOR PLANTING COTTON.

By T. J. HARRIS.

Cotton should not be planted in districts where the wet and dry seasons are not well defined, as uncertain weather is ruinous to the crop.

Soil.—A light sandy loam is the most suitable soil, though the plants grow luxuriantly in rich heavy soil if allowed sufficient room to develop, yielding, however, a smaller crop of cotton per acre.

Preparation of Land.—The land should be thoroughly forked or close ploughed east and west, and the clods well broken afterwards. Furrows about 6 inches deep and 4 feet apart should be made if the soil is light and rather poor, and 5 to 5½ feet if the land is rich, this time working north and south.

Sowing.—The seeds should be sown in July, as soon as possible after the furrows are made, the number of sowers being sufficient to keep up with the ploughman who is making the furrows. Each sower should be provided with a measuring-stick, the stick to be 15 inches long for the 4-feet apart rows and 2 feet for the wider planting in rich soil. At the spot where the plant is to grow the soil is drawn away with the fingers to the depth of 1½ inches and 4 inches wide. Five to eight seeds are sown and lightly covered, pressing the soil down somewhat firmly with the fingers if it happens to be rather dry.

Supplies.—As a rule, the seeds germinate in four or five days, and at the end of two weeks a few of the rows should be examined as to whether supplies are needed; if any of the holes have failed, the whole field should be gone through, and supplies sown at once.

Cultivation.—In a few weeks, depending on the weather, weeds will begin to show signs of starting into growth. A hoe or cultivator should now be used, repeating as often as necessary throughout the growing period to keep down weeds and to conserve soil moisture. It is well, however, to avoid having a dusty surface when the bolls burst, so cultivation may cease soon after the first bolls have formed.

Thinning.—When the seedlings have developed their second true leaf they should be thinned out to one in a hole, leaving only the strongest plant; in light, friable soil the discarded ones may be pulled out, but if the soil is sticky, and there is danger of disturbing the roots of the one that is to remain, they should be cut off below the two round seed-leaves.

Moulding.—Half the soil on each side of the furrow should be drawn up to the plants with a hoe when they have attained the height of 9 inches, and the remaining half when the plants are 18 inches to 2 feet high. In windy situations neglect to mould is fatal, as the plants are very brittle at the collar, and liable to snap.

HOW TO ESTIMATE THE YIELD OF COTTON LINT PER ACRE.

The yield of lint is estimated from the number of bolls on the plant. Count the bolls on a number of plants of moderate size, and take the average number per plant. For every 15 bolls, where the plants are in rows 5 feet apart and 20 inches apart in the rows, the yield is usually about 100 lb. of lint per acre. Of course this will vary slightly with the variety of cotton, and with the yield of lint per 100 lb. of seed cotton. On the average (in the Sea Islands), 300 lb. of lint are obtained from 1,100 lb. of seed cotton. Sometimes, however, where the variety has large seeds, and where the seed cotton has been kept for an unusually long time, as much as 1,500 lb. is required to yield 300 lb. of lint. This refers only to Sea Island cotton.

In several cases in Queensland where Uplands cotton has been planted at distances of 4 feet by 18 inches, which gives 7,260 plants per acre, the average number of bolls per plant has been 300. By the above rule, these plants should yield 300 lb. of clean lint per acre.

Where the plants are 5 feet apart in the rows, and 20 inches between the plants, there will be 5,227 plants to the acre. Supposing these also to produce an average of 300 bolls, then the return of lint would be about 216 lb. But in the latter case, the cotton being Sea Island, the cash value of the crop would be greater than for the Uplands.

Sea Island is worth now from 1s. 1d. to 1s. 3d. per lb. Uplands from 6d. to 8d. Thus 300 lb. of Uplands would return from £7 10s. to £10 per acre, and 216 lb. of Sea Island from £11 14s. to £13 10s. per acre.

COTTON GINS IN TRINIDAD.

The cotton gins imported by the Government of Trinidad are now in working order, and the planters have the free use of them, being only required to provide the labour needed for working them.

THE SUPPLY OF COTTON.

Since the cotton-growing movement in Queensland has reached a phase which points to the cultivation of a considerable area of cotton in the coming spring, we have heard doubts expressed as to the stability of prices in the home markets, and the ultimate success of the industry when once started. The following note, taken from the *Journal of the Jamaica Agricultural Society*, should have the effect of removing any such doubts:—

There never was a period in the history of cotton when the prospects of a great world shortage is so evident as now—a shortage, too, not like the one caused by the Civil War in the United States. Formerly it was almost wholly the county of Lancashire in England that consumed cotton. Now it still takes as much as ever—or would, if it could get it. It is not through want of trade, but lack of supply, that the mills there have shut down; and Belgium, Germany, Italy, Japan, India, and the United States have all large cotton-manufacturing industries besides. The United States does not supply itself with just the varieties of cotton that we can grow best—viz., Sea Island and Egyptian. It imports from Egypt annually 7,500,000 dollars (£1,500,000) worth of cotton. Was there ever an industry with such a good chance—when the world gasps for supplies, and cannot get them? Will the demand last? It is calculated that it will, for the United States are using more and more of their Upland cotton, while it is not probable that they will ever be able to grow all the Sea Island they require. A shortage for many years yet is in sight.

WEIGHT OF A BALE OF COTTON.

When our future cotton crops are being calculated, the basis of calculation will be the bale. In former days, a Queensland bale of ginned cotton usually weighed 400 lb. The American bale is 500 lb.; the Indian, 400 lb.; the Egyptian, 740 lb.; the Brazilian, 230 lb.; the Peruvian, 182 lb. The size of the American bale is $4\frac{1}{2}$ feet long, $2\frac{1}{4}$ feet wide, and $1\frac{1}{8}$ feet thick, weighing about 500 lb. This is equivalent to about 13 cubic feet. If shipped and freight paid by measurement of 40 cubic feet per ton, about 3 bales would be equivalent to 1 ton, but over $4\frac{1}{2}$ bales would equal 1 ton dead weight.

PRICE OF SEA ISLAND COTTON.

A consignment of cotton sent last March from Barbados to England realised from 1s. 4d. to 1s. 5d. per lb. It is stated to have been the best Sea Island cotton which has yet been imported from the West Indies.

THE SEA ISLANDS.

Many persons have the idea that Sea Island cotton takes its name from the South Sea Islands. This is quite erroneous. The Sea Islands which give their names to this particular class of black, free-seed, long-stapled cotton, form an archipelago stretching from Charleston, United States of America, down the coast as far as the Savannah River. The total area of the four larger islands—James, Edisto, Wadmalaw, and John's—is about 100,000 acres. There are five smaller islands—St. Helena, Lady's, Paris, Spring, and Port Royal. The climate is sub-tropical, the highest maximum temperature being 95 degrees Fahr., the mean maximum 68 degrees, the lowest minimum 10 degrees, and the mean minimum 49 degrees Fahr. The annual rainfall is about 32.70 inches; and it is highest during the period when the cotton plants are growing—viz., from May to August; and lowest when the crop is ripening—from September to November. The islands lie almost in the same latitude as Bermuda, 33 degrees N. latitude, 65 W. longitude. After the American Civil War, the cotton from these islands sold at from 1.50 dollars to 2 dollars (6s. 3d. to 8s. 4d.) per lb. But in 1867 disaster came in the shape of labour troubles, unpropitious seasons, rain falling for weeks at a time, rotting the crops and bringing with it the destructive cotton worm. The years 1868, 1869, and 1870 were no less disastrous. A new departure had to be taken, and the mode of cultivation was changed. The planting of large tracts was discontinued. Intense cultivation of smaller plots, drainage, and fertilising became the order of the day. The plough took the place of the hoe, and to-day the Sea Island planters are reaping the benefit of the new system inaugurated first at James Island.

COTTON IN THE CENTRAL DISTRICTS.

A few weeks ago we received from Mr. G. Sanderson, of Stanwell, near Rockhampton, several samples of cotton grown by him. Amongst these were some splendid bolls of Tuskegee Sea Island, from Alabama, U.S.A., which are equal to, if they do not surpass, the very best samples of cotton ever grown in Queensland. He planted four of Tuskegee and four of Russell's Big Boll, the latter seed received from the Department of Agriculture. From the former he gathered 5½ lb. of seed cotton, and from the latter 3 lb. With 3,000 bushes per acre, he reckons, supposing all to bear equally well, on a return of 4,125 lb. of Tuskegee seed cotton and of 2,250 lb. of the Russell. This would yield respectively 1,375 lb. and 750 lb. of clean lint. Putting the lint at only 6d. per lb. (it is really worth more than 8d. at present), Mr. Sanderson reckons that the return, if the seed is sold at 2s. per cwt. from the Alabama variety, would be £36 15s. 6d. per acre; and from Russell's £20 1s. per acre. His opinion as a practical farmer is, that a farmer can easily look after 10 acres of cotton, besides carrying on the ordinary work of the farm. By planting 10 acres of Tuskegee, he would realise over £360, or in the case of Russell's £200, to be added to his income from other crops.

Mr. Bottonley, who has visited Stanwell, expressed himself as delighted with what he saw there in the way of cotton, and predicts a great future for the industry there. He says he saw more cotton growing at Stanwell than in all the southern portions of Queensland he had visited. His first visits, on returning from Fiji, will be to Emerald, Alpha, and Barcaldine, after which he will go to Cairns, Kuranda, and Atherton.

A FEW PRINCIPLES TO BE OBSERVED IN COTTON-GROWING.

Mr. G. Sanderson, of Stanwell, who, with Mr. Hervey, may claim to be the pioneers of the coming cotton industry in the Central districts, says that the following points in respect of cotton culture should be attended to:—

1. Plough deeply—twice, if the land is stiff.
2. Plant 3 or 4 seeds in each hole, and cover not more than 1 inch deep. Plenty of seed should be used, as they help each other to break through a hard crust caused by rainstorms and subsequent drying winds.
3. As caterpillars like the young plants until they are a month old, let them have plenty, and the farmer will have enough to do to attend to those untouched.
4. Earth up the plants well, up to the first joint, and even more.
5. Run the horse-hoe between the rows at least three times. The plants will then take care of themselves.

RUBBER IN CEYLON.

This product continues to receive increasing attention. A large acreage has been planted up during the past year, some in the low country and at medium elevations, several companies having been floated for this purpose. Rubber is in a healthy condition, and the cultivation is carried on on modern lines, with every care to ward against the various diseases that affect all trees. Some months ago a canker was found on the trees on one small estate, and the Government Mycologist made a prolonged tour of the rubber district, visiting all the rubber estates of any size. He estimated the amount of canker existing in the rubber to be less than 1 in 200 trees, with the exception of places (some 40 acres) where the canker originated, which had a much larger percentage diseased. The abnormally wet season caused many trees to drop their leaves much earlier than usual, and this was thought to be sign of lack of health or due to over-tapping. That the latter was not the reason of this fall of leaf was proved by the fact that many untapped trees behaved in this way, and many of those heavily tapped remained in full leaf. No specific disease was found on the trees, and when more favourable weather came they came in full leaf again. This inclemency of season also caused a shortness in the crop of seeds on many estates. Throughout the year the home demand has continued active. The prices realised have ranged from 4s. to 4s. 3d. per lb. for good para biscuit; ceara biscuit has sold for as much as 2.60 rupees per lb. in the local market. The next few years should show a steady increase in the export of this product.—*Tropical Agriculturist*.

THE POSSIBILITIES OF RAMIE.

IS IT A SUBSTITUTE FOR OR A RIVAL TO COTTON?

We have received from Mr. G. A. Vaughan, Government Printer, the following most interesting article on the value of Ramie to the producer, manufacturer, the consumer, and the public at large, written by Mr. D. Edwards-Radclyffe, West Hampstead, London, England, for *The Draper*. It comes appropriately in connection with a short article we published in the May number of the *Journal*, emanating from Mr. Arthur C. Carpenter, Secretary of the Ramie Fibre Company, at Romford, Essex, who wrote to the *Mackay Sugar Journal* warning farmers against being too sanguine on the subject of growing Ramie. The two articles should be read together, and the reader will then be able to form his own conclusions on the subject.

We know that Ramie thrives luxuriantly in Queensland, and we also know that the main reason for its not being grown commercially in this State

is the difficulty and expense of preparing even "strips" for the home market. If any simple machinery could be got for the purpose, no doubt many would begin cultivating this easily grown plant:—

RAMIE, THE TEXTILE OF THE FUTURE.

The cotton crisis brought about by speculators who do not scruple to put their wealth to as unrighteous a use as it is possible to do, in order that a few may gain untold wealth at the cost and suffering of hundreds of thousands—for it is no untruth to say it starves and destroys thousands of workers in cotton who cannot help themselves, and this happens in America as well as in England, though perhaps not quite so acutely—and it is an abuse of the strength and power of wealth which was never intended by the Creator to be put to such unholy uses; and I can only hope that the adage, "that out of evil oftentimes springeth good," and the lesson adversity teaches us, may prove of lasting benefit to posterity in this instance, as it prompts us to take the power from the hands of those who abuse it. The cotton supply at present is in the hands almost of one grower or nation. Fully 80 per cent. of the world's supply is in the hands of Americans. This crisis has one good result for the world generally, for a strong British cotton-growing association has been formed to foster the growth of cotton all over the world and, if successful, it will benefit the world at large, Americans included, for the manufacturers will no longer be dictated to, as fair prices must naturally follow; but there is yet a greater gain—it has brought Ramie prominently to the fore. I am convinced that if this wonderful fibre had received the attention it deserves, the cotton crisis, Lancashire famine, such as happened during the American Civil War so acutely, and which is happening to-day though not yet so severely, would be impossible; as, whilst Ramie is obtainable, it would, so to speak, support the weaker fibre, as cotton gamblers could not and would not operate in—i.e., corner—cotton when Ramie could be used as a substitute. I am not putting it forth as a substitute; I maintain it is a rival, and a formidable one, for there is nothing which cotton makes that Ramie cannot imitate, but there is much Ramie can produce which cotton cannot imitate. Ramie grows where the climate is moderate; everywhere where cotton grows and where cotton cannot grow; this I think goes far to prove my contention that Ramie is a rival.

WHAT IS RAMIE?

Let us examine briefly what it is, and its possibilities. Ramie is a nettle, *Urtica* or *Boehmeria*, easily grown and easily worked; and there is no reason why it could not be manufactured in every country where it is produced, from the field to the loom, as it were. The present cotton crisis affords a favourable opportune moment to examine into the merits of this wonderful fibre, and the reason it has not been adopted generally, and contributed to, as it must eventually do, to the wealth of our nation and Empire. I will endeavour briefly to bring the possibilities of the fibre before your readers; those who are acquainted with it may revive their interest in it, and those who now learn its nature for the first time may, I hope, become interested and join the ranks of those workers who are endeavouring to place it in the position of the economy of our Empire's agriculture and manufactures it deserves, and so contribute to the wealth of our nation and Empire. What is it? *Urtica*, *Boehmeria*, Ramie, Rameh, Rami, Rhea, Riha, Recha, China grass. The fibre of a plant that grows almost in any zone, of course with varying results. It belongs to the nettle tribe. It is easily cultivated, propagated from seed, cuttings, division of roots. I believe in India, Malaya, China, Assam, and other places it is called a variety of names in addition to the above. Kankura, Kankhura, Risa, Ritza, Chuina, Gaygai, Pama, Kund, Kurkunda, Sumsha, Pan, Gun, Gwon, and others. This gives some idea of the extent of its wild state. The natives in many countries use it for fishing lines, nets, and work it into clothing. Assam ladies have a gauze or Riha shawl or breast cloth, but I will speak of its uses later.

It is many times stronger than cotton, jute, flax, hemp, wool, and the like. It has a very long staple, 3 to 9 inches. It is beautifully lustrous, more after the nature of silk in appearance, no necessity to mercerise it, and, as in the case of cotton, kill its strength. Its lustre remains permanent as also its strength, and it improves by washing. It does not rot, a quality alone that should recommend its use for many purposes; a fibre possessing so many good qualities which can be grown so universally was never intended by the Great Architect to remain to "blush unseen." Now let us consider how it comes to pass that it has not been adopted by our manufacturers.

REASONS WHY IT IS NOT YET ADOPTED.

The plant has been well known to our authorities for many years; the earlier travellers have seen it used by natives in many countries. The Chinese are fully aware of its merits; the Japanese also are working it; and it is imported here in fabrics which pass for other materials than the real origin. The wealthy Chinese use it very largely, and it is cultivated very extensively in China for use in that country, but little is allowed to be exported. In China it takes its place as a valuable textile; they have no difficulty in manufacturing it, in fact, the patient and poorly-paid Chinaman industriously separates the fibre by scraping with the fingers. That and rougher methods of beating on flat stones, and similar primitive methods, are adopted by natives in other countries; but this makes it difficult to handle in large quantities. The Government of India, appreciating the valuable asset, conceived the idea that it would foster the trade and promote its adoption if they possessed a machine to decorticate it. By so doing I consider the hands of the clock were put back, for they invited inventors to produce a machine to do almost impossibilities, mechanically to extract a gum which is somewhat prolific in the plant, and which, I am given to understand, is very valuable, and may in the near future alone suffice to encourage the planter to grow Ramie for its production. The result of the offer was this—a handsome reward set mechanics to work to produce a machine to treat a plant which they had never seen and knew but little about, except from the descriptions issued by the Government officials. Result was abortive, for the machine was not produced, and the would-be planters were deterred from cultivating it, as they feared they would not be able to handle the fibre when grown. The result was a sort of "impasse." Manufacturers wanted Ramie, but would not start Ramie mills till supplies were assured. The planters were afraid to grow unless contracts were made and guaranteed beforehand, and so we travel, as a French writer has it, "*dans un cercle vicieux*" (in a vicious circle). All this is now altered; the demand has arisen, the market is ready; it only remains for our planters and farmers to supply the requirements. Now, had the Government first encouraged the planter to produce, the progress would have been rapid, as a demand would have arisen to treat the vast crops, and the process of evolution would soon have put the necessary machines in the market, the decorticator would have followed production as the mill followed corn. Experience, however, has taught us there is no difficulty in extracting the fibre to-day, and planters will do well to start cultivating. The Chinese and others work it without machinery into ribbons; our Colonial brethren could do the same, although if it is grown in sufficient quantities, machines are ready, as also a process to degum, and save this valuable product at the place of production.

DIFFICULTIES SURMOUNTED.

I will now treat another aspect, the manufacturer's difficulty. The merits of Ramie were known to a few, and they determined to use the China supply, and started to produce an article to compete with cotton, attempting to do it in the existing methods adapted to cotton, flax, silk, wool, and the like, instead of first constructing a process to treat such a special staple on purposely constructed machinery. Result, as was naturally to be expected, enormous

waste, added to this for want of foresight in contracting for supplies at a price that would pay to work, the demand was quickly taken advantage of by our importers to raise the price of raw material, so what with the waste and high price of supplies, and the initial mistake in putting it forward as a competitor, the attempt, which at best was but feeble, failed.

A third reason is perhaps not the least why Ramie is allowed to remain idle. The company promoters were not slow to grasp the vast possibilities of the Ramie industry, and schemes and promotions were started, promising all sorts of impossible achievements, when the knowledge even of the requirements of the fibre had not been ascertained. First, it was a degumming process, which in several cases was so imperfect it absolutely destroyed the fibre. Second, the filasse, when obtained, could not be sold, as the existing machinery could not treat it. Third, it was a decorticator, which perhaps might have done its work, had there been any demand for it; but the plantations, unfortunately, which were required for its use were non-existent. Fourth, a great cry was made about the wild plant existing in vast tracts, &c.; the material "could be had for nothing," a fallacy, which I can illustrate simply. Nettles (stinging) grow here in a wild state, yet if an industry arose to use these, the costliest method would be to attempt to collect wild stuff; they would have to be cultivated. Another illustration is—our blackberry grows wild, yet to purchase at Covent Garden is almost impossible except in small quantities, and then at a higher price than our cultivated fruits; all because of the difficulties in collection in quantity to pay. If blackberries are to become an article of commerce they must be brought into cultivation as in America, and so it is with any wild growing plant; to treat it commercially it must be cultivated. The result was, of course, failure. I am afraid several companies were started as promotions, and it was not intended they should succeed. All this, therefore, has militated towards the retarding of Ramie. I say retarding, as Providence did not send us so grand a material to be wasted; it is bound sooner or later to take its place in the textile industries of our Empire, and no doubt other countries. If all the money wasted on abortive attempts, some of which were intentions to waste, and others were *bonâ fide* attempts, but starved for want of proper support; if all this capital were collected and put into one coffer and used judiciously, the Ramie industry to-day would be "*un fait accompli*" (an accomplished fact) for this reason:

WHY IT MUST SUCCEED.

The fibre has merits possessed by no other plant. It grows where cotton will and where cotton cannot grow. It does all that cotton does and cotton cannot do; and the same can be said of hemp, flax, jute, silk, and the like. It is not a substitute, it is a rival, and a formidable one to any of these fibres. It is the greatest mistake to put it forward only as a substitute; it is vastly superior to any of these fibres, if only in strength and lustre, to say nothing of its enormous durability, and also because it can be so easily worked. I see no reason why it should not take its place, and be manufactured in each of our Colonies where it will grow.

Profiting by past experiences (and how profitable it is to learn by mistakes and adversity!), I would deprecate any attempt to put it on the market as a substitute, not that it cannot compete as a fibre, but the very fact that cotton, flax, hemp, jute, and the like have been with us many decades, are cultivated, and consequently the price of the raw article would in many manufactures swamp Ramie, but the possibilities that it ultimately will compete are in evidence, for as it can be so universally grown, and so easily treated, is proof the time is not far distant when it will favourably compare at first cost with cotton, hemp, flax, and the like, when cultivated on the same scale. In fact, it does now compete with flax, and even cotton, if the present high prices are to maintain. It can be bought at prices varying between £18 to £40 c.i.f. I have bought at both figures. We will take £30 as a safe price; at that

figure there is a vast opening, and there are many articles now made with flax, cotton, &c., that could be imitated by Ramie, and sell at same price at a profit, given the raw material at £30 per ton; but why imitate, when it possesses qualities that endow it with superiority, and even if it cost £40 per ton could make a hundred articles that would command a huge sale at special prices, as they would be articles which no other fibre would or could compete in? Sir Titus Salt made a colossal fortune out of one article—"Alpaca." Lord Masham, when Mr. Lister, made millions out of silk waste; Messrs. Holden and many other of our merchant manufacturers and princes did the like for one or other *specialité*. There are a hundred things waiting for the enterprising manufacturer if he will take up Ramie. I have always maintained Ramie should be started on its merits, and in this I am pleased to see well-known authorities, such as Sir George Watt, Bart., C.I.E., and Mr. Charles Richards Dodge concur; and to illustrate my meaning I will quote the latter gentleman's report in a Government pamphlet, in which he urges the cultivation of the Ramie plant: "Facility to imitate all other textiles is one of the principal causes which has kept back the development of the Ramie industry; and if instead of launching out into a series of experiments, attention had been concentrated upon the exclusive manufacture of those articles to which the properties of the plant were peculiarly and naturally adapted, this industry would probably be in a more advanced condition than it is at present. The folly of building up a Ramie manufacturing industry on a false basis, that is, employing the textile as a substitute for something else, is to be deprecated. The fibre should be used in those articles of economic necessity which would appear on the market as Ramie, that any distinctive merit the textile may possess will become known not only to the Ramie trade, but to consumers of the produce."

THE WEARING QUALITIES OF RAMIE.

I will give you a small illustration. I made myself a Ramie waistcoat ten or twelve years ago; it is being worn to-day, and has much wear in it yet; it has been washed a hundred times at least. I sent out khaki (Ramie) tunics to the South African War, a trooper wore one night and day; it outwore three cotton tunics worn under the same conditions by troopers in the same company, and it has plenty of wear in it yet. The wearer always presented so respectable an appearance he was called the "Duke" of his company. Another tunic was looted from the train by Boers. I expect one day the Government will have an inquiry from South Africa, "Can you tell us of what material this is made? Our man cannot wear it out." We will compare the cost with cotton.

Cotton costs	...	...	...	5	Say Ramie costs...	...	...	10
Making up	...	...	...	5	Making up	...	...	5
				10				15
Three cost	...	...	...	30	One Ramie costs	...	...	15

The Ramie is still serviceable and costs only half the price; but it does not end here. The tunic is worn only at the cuffs; say new cuffs cost 1s., and it will still outwear one or more cotton tunics. In the end the Ramie costs about one-third the cost of cotton; that is not the only gain, as in the case of clothing troops, police, and other uniformed bodies there is the saving of distribution, warehousing, handling, transport, &c. For hard wear no other material competes with Ramie, and for such purposes as these there is no end to its use, even though dearer to start with. The same experiment is being made with a servant's dress, and it won't wear out, no matter what hard wear or washing it is subjected to.

A FORTUNE AWAITING SOMEONE.

This is only one article. I would give any enterprising manufacturer a hundred proprietary articles he could manufacture and fear no competition; and yet each would make him a fortune as in the case of "alpaca." It is therefore on these lines Ramie should start; for such a start there is abundance of raw material, and, as demand grows, supplies from parts will follow

to the mutual advantage of manufacturer and producer. I quote the following from *Tropical Agriculturist* (Ceylon?—Ed. Q.A.J.):—

“Ribbon Ramie could be delivered at degumming factories at £7 9s. a ton; it would pay handsomely, and be largely used, although £26 was paid for it. I have conclusively proved that it is one of the least difficult of fibres to prepare for manufacturing, and far surpasses those obtained from flax or hemp. Were Ramie put to the same ordinary use as flax, the waste after degumming would scarcely be half of that of flax. Will Ramie, Rhea, or China Grass get the chance that it has been denied? When this comes to pass it will revolutionise the industrial affairs of the Empire, and bring untold wealth to Eastern climes.”

In this prosperity, of course, England and the whole Empire would share, and the same paper quotes: “It is both the duty and interest of every owner and cultivator of the soil to study the best means of rendering that soil subservient to his own and the general wants of the community; and he who introduces beneficially, a new and useful seed, plant, or shrub into his district is a blessing and an honour to his country.—Sir J. Sinclair.” I have heard it said, he who makes two blades of grass grow where one originally did, deserves well of his country. Let our great manufacturers, capitalists, planters, and others take this to heart, and he or they who introduce or support the Ramie industry will deserve well of the Empire. After all, it is not a great undertaking. We have hundreds of capitalists capable of fostering the industry “off their own bat,” and their millions would soon become multiplied. Mr. Andrew Carnegie is giving large sums to help the land of his birth; here is an opening for him. Will he take it, or are there no patriots to step forward and help in the great work, adopting as their motto, “*Floreat Ramie*”?

POSITION TO-DAY.

Now the position of Ramie appears to be this: All agree it has wonderful possibilities and merits. Everyone speaks of its good; no one can produce anything against it. Yet, so far, it has not made headway, and for reasons I give in the foregoing lines. The question therefore is, How can we bring about a different state of things? I should say, only by reversing the mistakes of the past. First, our Government, the Indian Office, Colonial Office, Crown Colonies, Boards of Agriculture in all Colonies, should send out a pamphlet expatiating on the merits of Ramie; offering help in seed, plants, &c.; advising how to grow; and offering help in shape of loans, &c. Offer bonuses for amount produced. Set up decorticating and degumming stations, such as mills grind corn here, and the Central Mills crush the sugar-cane in Queensland. In short, let planters grow it, and for every ton grown two more will be required for many years to come. To our manufacturers I would suggest they study the merits of Ramie, and start manufacturing “those articles to which the properties of the plant are peculiarly and naturally adapted.” There is plenty of raw material available for this purpose, and as the increased demand is created, our Colonies will respond with further supplies.

The raw material comes here in a partially degummed state, and it has to be treated here; naturally, the process is more difficult, as the gum has been allowed to dry, and it has then to be brought into a fluid state. This at one time offered difficulties which to-day are removed; the process is now as sure as simple. I consider, however, this is a topsy-turvy sort of procedure. The fibre should reach us in a degummed state. The degumming should be done at the plantation whilst the gum is fluid, and when it can be saved. It would require but little effort to strip the stems in a green state, either by hand or by machine, and pass them into filasse. Small farmers would find it pay to strip by hand as the Chinese and other Asiatics do, subjecting it also to washing. In this, children could assist, so the process need not be expensive. In districts where largely grown, the erection of decorticating and degumming stations could be set up, or even decorticators could be loaned out, as threshing

machines, &c., are to corn growers here. A dozen industries or trades would spring up: the planter, the decorticator, and degummer (filasser), the merchant, broker, manufacturer, spinner, and weaver are among a few who would find employment. It is in the filasse form our manufacturers in the near future will obtain supplies, and then, according to the purposes to which it is to be put, the process of cleaning and separating the fibre will be undertaken. I think it possible this will become a trade in itself, the cleaning and preparing the fibre into slivers or rovings, or such forms as the spinners require. Then the process of making yarns can be taken up by existing machinery, and passed from them to the weaver.

AN OPENING FOR THE COLONIES.

The process is so simple there is no reason why Ramie manufacture should not be started in India, and, in fact, in all our Colonies. In some of our Colonies it will be possible to put down Ramie so as to harvest it daily. I know a plantation where it is so done, and in this way the decortication and degumming, can be carried on simultaneously and continuously. If, therefore, manufactories are started where it is grown, the advantages are obvious and manifold. First, the raw material will not be hampered with freight; second, the local requirements will be better studied by the manufacturer. There will always be plenty of uses for Ramie in England, and the manufacturers need not fear our Colonial brethren will take their occupation. Although it would be but fair retaliation, as Ramie has long been boycotted by the cotton manufacturers as a rival to cotton, a mistaken policy which is proven to-day by the cotton crisis. Had supplies of Ramie been forthcoming, the present stagnation would not be possible. It is absurd to treat the fibre as a substitute for cotton; it is far and away superior. The waste (noils) of Ramie even are equal to cotton, and could be treated on cotton machinery, and if only they were forthcoming would be a boon to cotton spinners to-day. To wind up my remarks, I would point out there are no difficulties now existing as regards to Ramie growing, preparing (decortication and degumming), and manufacturing. The crux of the question is capital and supply of raw material.

There are plenty of supplies possible to create a large trade in Ramie products (specialities), and it invites the capitalist to employ his capital in an industry that will remunerate him "beyond the dreams of avarice." To the planter there is a splendid opening, and as he produces so the demand will increase; as the supplies of raw material are forthcoming so the demand will increase, and the trade expand; and I will wind up my article with a letter I addressed to the Agents-General of our Colonies; it will prove interesting alike to the producer and manufacturer. To the one I say, produce all you can; to the other, manufacture without delay.

One of the great boons will be to prevent the vast misery caused by the unscrupulous tactics of the Rings formed to corner cotton; the enormous misery they cause to the poor operatives, and Lancashire cotton famines would be relegated to a nightmare of the past. There is an association formed to spend a million on cotton growing in our Colonies, a laudable undertaking, but they could and should also encourage Ramie growing. Will anyone help me to start a league to grow Ramie? A greater gain would accrue to the Empire, and only a small sum would be necessary to start the ball a-rolling, and Ramie a-growing. If the Agents-General and Ministers of Commerce would circulate the following, and recommend their planters to try, and the Colonial Press throughout our Empire would expatiate on the merits of Ramie or Rhea, and its enormous possibilities, there is no doubt our farmers, planters, and land owners have but to have it brought to their notice for supplies to be forthcoming:—

EASILY CULTIVATED.

I would call your attention to the possibilities of Ramie (Rhea) which undoubtedly is the textile of the future. If you can grow this fibre, which is easily cultivated, there is a vast trade with Europe possibly. It would be

especially welcome in England as a rival to cotton, and would do much to prevent the corner in cotton so easily worked by American capitalists, as experience teaches us to our cost. A Lancashire cotton famine would not be possible if supplies of Ramie were forthcoming. It would also help to make a self-contained Empire—we should produce all we want independently of other countries. The fibre is as easily worked as it is grown, and I see no reason why the industry should not be fostered in your colony from cultivation to spinning or even weaving (from the field to the loom). I would suggest the Government provide seed or plants. It is easily grown from seed. It is not ravaged by insects. It is used as fodder, and even the leaves are consumed as a vegetable in some countries. In every district where the plant is freely grown, set up decortication and degumming stations, such as mills grind the corn here, or the central stations crush the sugar-cane in Queensland. If the Government does not put up these stations, then they should encourage the capitalists to form syndicates by giving a bonus on the amount produced.

The degumming stations would be highly profitable. First, the fibre would be extracted in the form of filasse, easily packed, and a great saving in freight effected as compared with ribbons. Second, a profit would be made on the enhanced price the filasse would command as compared with ribbons, overburdened with freight. Third, the waste products would be a source of income, and would show a profit on the cost of working the fibre to filasse. The by-products are: (a) the gum, which is very valuable; (b) the fibre in the leaves and lateral shoots could be worked into paper-pulp; this would command a high price, as it makes the finest paper. All these products—the filasse, the gum, and the pulp—would command good prices in England and Europe; and if your manufacturers will treat the fibre in the country of production, there is no reason why the yarns should not be sent over here, after retaining sufficient for your home supplies. If the Government will fall in with my suggestions, I shall be pleased to offer my services on the principle, “no cure, no pay”—i.e., I am content to take my remuneration in share of profit. If the Government is of opinion the trade would be best conducted by private enterprise, I think the initial stages should be fostered by the Government making the preliminary experiments as to growing, &c., offering planters the seed or plants, either free or at very low rates, and by offering assistance in the shape of loans for planters to get large tracts under cultivation, and to the district councils to enable them to put up decortication and degumming stations, and by recommending capitalists to take up the planting, filassing, spinning, weaving, &c. I think the Government would do wisely to advertise the possibilities of the fibre, and the reason the textile of the future will have such a prominent place in your and our industries:

THE ADVANTAGES OF RAMIE.

1. It is many times stronger than cotton, flax, hemp, and the like.
2. It has a very long staple, from 3 to 9 inches.
3. It is easily grown, as it acclimatises itself in almost any zone, where agriculture is possible of course, with varying results, as it crops in some latitudes as many as four times per annum.
4. It is beautifully lustrous, more after the nature of silk in appearance.
5. It does not rot, giving it, for many purposes, such as fishing lines, nets, sail cloths, ropes, boot and saddlery thread, tarpaulins, rick cloths, tents, hose, shop blinds, boot linings, and other requirements necessitating exposure to damp, great advantages.
6. It is non-elastic, and herein it is invaluable for machinery belting and ropes; measuring tapes, mixed with wool, it imparts non-shrinking possibilities to that article, and many other purposes where rigidity is an advantage.

7. I could further expatiate on its merits, but space forbids. I will curtail my remarks by stating there is nothing which wool, cotton, flax, hemp, jute, and even silk produce which this fibre cannot imitate, and in most cases excel. It makes splendid cloth for uniforms, and almost indestructible table linen, sheeting, dress goods, velvets, curtains, lace, tapestry and upholstery purposes, lamp wicks, waist-coatings, trousers, duck, riding breeches, &c. It is an ideal hygienic clothing, invaluable for underwear. It is pronounced by the medical profession as the most advantageous surgical dressing and for body wear. I will wind up by pointing out that its durability and toughness alone commend it as a material that is invaluable for its indestructible qualities.

There are many purposes for which its peculiar properties make it extremely valuable; for instance, incandescent gas mantles. It excels all other fibres, and in this alone an ever-increasing demand will consume enormous quantities. I could instance many other purposes, but I think the foregoing are quite sufficient to extol the merits of

THE TEXTILE OF THE FUTURE.

Small farmers wishing to start Ramie can do so without any great outlay, and they can prepare the fibre for export without costly machinery. I do not recommend degumming stations except on large scale. Small parcels of fibre can be shipped and the degumming can be done here. Now, a last word, one of advice. Do not attempt to introduce Ramie as a substitute for any fibre, its merits are so many; introduce it to the public as Ramie, and let it carve a way for itself; it will soon do so. Here is a field for capitalists to use their wealth to a good purpose, one that will benefit the community at large, and be of universal benefit and of vast profit to themselves, and be a blessing to all, not a misery such as the unholy use it is put to in "cornering" cotton and starving thousands. Rich manufacturers would double their wealth by running any one of the proprietary materials I would put them up to manufacture, which would be a benefit all round to the grower, manufacturer, and storekeeper, and a benefit to the users.

If further information is required how to procure seed, plants, and cultivate and prepare the fibre for the market, and how to dispose of the produce, also advice as to the installation of degumming and filassing stations, manufactories, &c., stamps should accompany all requests for particulars as a proof that it is not an idle inquiry; in short, any assistance I can give to encourage the world-wide cultivation of this fine fibre, you have but to apply to D. Edwards-Radclyffe, 25 Birchington Road, West Hampstead, N.W.

CONCERNING PAST FAILURES.

I am aware past failures have prejudiced its adoption. I have been told "it won't stand, it rots"; "it cannot be degummed"; "it won't grow from seed"; "it cannot be decorticated"; "it's too hard"; "it creases"; "it splits"; "it is only fit for ropes"; "impossible to spin"; "it won't take dye"; "no machinery to work it"; "too long staple." I have even had it asserted, "It will never do because it won't wear out." All this mischievous, idle talk has spread and helped to prevent would-be investors from supporting the trade. All this I can disprove by the beautiful fabrics I possess, and the better proof is that the Chinese, Japanese, Germans, and French are making profitable use of it. Why are we English so backward? If we are to compete with the go-ahead nations, we must not let "I dare not" wait upon "I would." We cling to old methods, ideas, &c., till others step in before us, and then at last moment, for self-preservation, we adopt the example others set us. We should take the initiative if we are to progress as of old. Is it not time we seriously investigated the possibilities of placing Ramie on a sound basis? Are there no enterprising patriots willing to help put Ramie in the sphere it deserves?

Could not a combine be formed, planters and manufacturers willing to produce and manufacture? Ramie is knocking for admittance to the economy of our Empire; admit it, and add to our wealth.

At the request of several governmental departments, I have been collecting evidence as to the possibilities of Ramie being used here in England, and the opinion as to its merit. The testimony includes chambers of commerce, technical schools, professors, manufacturers, brokers, spinners, weavers, and others, and may be summed up as "there can be no two opinions as to the merits of this wonderful fibre; it could and would be used in vast quantities if regular supplies can be assured at fair and reasonable prices." It also elicits the fact. It is being mixed with wool in the manufacture of underclothing, sail-cloth, paper-making; French and other bank notes are made of Ramie; and it is employed for many purposes where its use is regarded as trade secrets. Incandescent gas lighting alone would absorb large quantities. Germany consumes 150 millions of mantles per annum; this will give a general idea of the vast consumption possible if the rest of Europe adopts incandescent gas lighting on the same scale. Several manufacturers are prepared to treat quantities varying from five to seventy tons per week. This, I think, speaks volumes for the prospects of Ramie, and enough to convince any government, colony, planter, farmer, and all whom it may concern, as to the enormous trade open to them in Ramie-growing.

If everyone, be he editor, Minister of Agriculture, Agent-General, farmer, planter, or landowner, will help towards establishing the growth of this wonderful fibre, they will deserve well of their country, and confer an enormous benefit on our grand Empire.

I see the *New York Tribune* has been pointing out to planters "the urgent necessity for the introduction of other crops to take the place of cotton." If the Americans, who are evidently so hard hit by this cotton gambling and the insect pest, are on the lookout for substitutes, how much more is it to our colonies' advantage to grow Ramie, which could easily take the place of cotton. In addition to the ease with which it can be cultivated, it has a great advantage over cotton and most crops, in that it does not suffer from the ravages of insects. The large quantity of tannin in the composition of the plant protects it in a great measure from insect pests. Our colonial planters will do well to consider this. *Floreat Ramie!*

JUTE.

Jute is the name given by Dr. Roxburgh to a textile plant which he introduced into Europe from India in 1795. Many such plants in Bengal go under the native name of Pat, but there is a Bengalee word, "Juta," which is evidently derived from the Sanskrit "Jhat," and Europeans have long since adopted the word Jute as descriptive of a fibre plant belonging to the order Corchorus, of the family Tilliaceæ. About 40 varieties belong to this family, but the well-known jute of commerce is the product of *Corchorus capsularis*, *C. Olitorius*, and *C. Fuscus*. We are here, however, not so much concerned with the botanical description of the plant as with its value as a commercial product, which might add one more valuable industry to those already occupying the attention of cultivators of the soil in Queensland.

It has already been proved that the Jute plant will thrive everywhere on the coast lands of the State, and it has also been shown that, in order to come to perfection of growth and production of fibre, a moist, warm climate is required. Such a climate is found more in the Northern portion of the State than in the Southern. That is to say, that Jute may be profitably grown anywhere north of Townsville, where the heat is tropical and the rainfall abundant.

SOIL.

The jute plant, being a rather exhausting one, demands a very rich, moist soil, and even with a rich soil manure may be applied with advantage. A considerable amount of alkali in the soil is not detrimental; indeed, it would appear to thrive best where such alkali is abundant. Land which is subject to periodical inundation is to be preferred to that which lies above flood reach. Such lands are available on most of the rivers of both the South and North, and it is there that the prospective jute-planter should commence operations. Another reason for the North being more suitable than the South for jute-growing is that running streams are to be met with in several districts, notably between Geraldton, on the Johnstone River, the Lower Russell, the Barron, and others. But this water question I will enter into more fully when I describe the process of preparing the fibre.

SOWING AND CULTIVATION.

The land on which it is proposed to sow jute should be deeply cultivated, and it is all the better for the plants if it be subsoiled. It must then be well harrowed, cross-ploughed, and again harrowed until it is brought to the finest possible tilth. In Bengal, the ryots think nothing of ploughing and harrowing with their primitive implements from 20 to 25 times, in order to ensure a proper seed bed. After the first ploughing, the land should be left for a time in rough furrows to sweeten and mellow down during the winter. After the last ploughing, and just before sowing, whatever manure is required is led on to the land, and well harrowed in. The seed is sown in August or September (March to May in India). It is drilled in in rows 8 inches apart, and the same distance between the plants in the rows. Broadcast sowing is not advisable, as it is a waste of seed, and the crop cannot be kept clean.

It must be borne in mind that, as in the case of all fibre plants of the nature grown for fibre, close sowing is needed for several reasons. If the plants are far apart, instead of shooting up straight stems they will throw out branches, and the lower down the stem these branches are formed the more difficult will be the subsequent harvesting and extraction of the fibre. Planted far apart, the plants are exposed to all weathers, and such exposure leads to a hardening of the fibre, even to a wooden consistency. By close planting, both these objections are overcome, the plants protect each other, and each runs up to a considerable height before branching out. If the seed is sown with a drill, the quantity required will be from 18 to 20 lb. per acre at the outside. The seed should not be deeply covered, not deeper than in the case of wheat. When once the sowing is completed, the field can be left to itself until harvest time in the same manner as wheat, barley, and oats. Weeds are not to be feared, as the jute plant grows so rapidly and the foliage so quickly shades the ground that they have no chance of overtaking it. As for pests, there are few which trouble it. In abnormal dry weather, irrigation must be resorted to, but, under conditions demanding constant irrigation, good results cannot be expected. The plants appear above ground in from 4 to 8 days after sowing, and grow so rapidly that the crop is ready for harvesting in about 4 months.

HARVESTING.

As soon as the flowers begin to wilt and here and there seed-pods are formed, then is the time for cutting. By earlier cutting, a brighter fibre is obtained, but this is at the expense of strength. Again, if cutting is delayed after the wilting of the flowers, the fibre is certainly stronger, but darker and more woody. Should the cutting be deferred till the seeds are ripe, the result will be the production of a dark-grey, coarse, hard fibre, utterly valueless for weaving purposes. It is on account of delaying the harvesting till after the ripening of the seed that such a quantity of inferior jute is put upon the Indian market. If the plant is grown for fibre, there can be no question of seed-

production, for if not fully matured it is valueless, and when fully ripe it is worth very little as a marketable commodity, and the best yield only reaches about 1 cwt. per acre.

If only a fine quality of fibre is required, the plant is cut about 2 or 3 inches above the ground, but coarse varieties are taken out by the roots in order to gain as much fibre as possible. In the United States jute is cut with a mowing machine, which thus reduces the cost of harvesting.

When the cutting is going on, the plants are tied in small bundles after the twigs have been cut off, and left for 3 or 4 days in the field. The wilting of the stems during this time materially assists the retting process. The stems which are to be employed in the weaving of coarse fabrics are taken at once to a shed to be dried in the shade.

PREPARATION OF THE FIBRE.

To obtain the fibre, the plants are subjected to a "retting" process, as in the case of flax and hemp. It should here be mentioned that there are two methods of separating the fibre of such textile plants from the woody part. One does not demand water, and is called "dew-retting." The other method requires a plentiful water supply. Running water is not absolutely necessary; in fact, in India, still water is preferred to the former for one reason, which is that it quickens the retting process, and another is that by using running water the process takes several weeks longer, added to which is the danger of the fibre being discoloured by sand or mud. In hot countries dew-retting is rarely practised. The requirements for this process are a smooth grassy lawn and a shady situation. Certainly, dew-retting is a more convenient and pleasanter way of conducting the operation, but it takes a longer time than if the decomposition is carried on in stagnant water. In this process the stalks are spread out thinly and evenly on the sward, and, when they are partly decomposed, a pole is passed beneath them and they are turned over in masses, and the whole is then left to the operations of Nature. In a hot country the exposure to the hot sun causes the fibre to become dark-coloured and brittle.

"Water-retting" is to be recommended for all hot countries in preference to "dew-retting." The work is performed in less time by the former method, and a brighter, softer, and consequently a more valuable fibre results. Standing water is universally used in India, because it is everywhere to be found, and because it acts more powerfully as a decomposing agent than running water. The latter is occasionally used, as it leaves the fibre brighter in lustre. The arguments against running water I have given above.

The native Bengal growers dig a pit, fill it with water, throw in the bundles of jute, and keep them beneath the surface with stones. The Europeans open a series of ditches, as is done in Europe for hemp and flax. These are about $3\frac{1}{2}$ feet deep, 17 feet wide, and about 16 to 18 feet long. A wooden platform lies on the bottom, and the sloping sides are sown with grass. Arrangements are made for letting in or drawing off the water at will. Only soft or rain water may be used. Any water which will not cause soap to raise a lather is not to be used. If the water is very cold, it should be left in the ditch for a few days to get warm, for the warmer the water the quicker the retting process. The water can only be used once. It forms then a good manure. It will poison all the fish that happen to be in a waterhole used for jute-retting.

The bundles of jute are laid in the ditch in a slightly slanting position, with the butts downwards. The latter ret quicker than the tips, and should be in the coldest water, which will be found at the bottom. The bundles must be weighted with stones, so that they are covered with 5 or 6 inches of water. In Southern India the bundles are covered with reeds before being sunk, to protect them from the sun's rays.

From time to time, a stalk is withdrawn from the middle of a bundle to see how the retting is progressing. If it is found that a stalk taken from each of two bundles, at some distance from each other, cracks and breaks, without

bending, and that the skin peels off easily, the process may be considered as complete. Then the bundles are taken out, but this must not be done with a pitchfork or any other implement. A man steps into the ditch, lifts each bundle carefully, and hands it to a man on the bank, who opens it and spreads it out thinly on a clean spot to dry. There will be no need to turn them over afterwards. As soon as the stalks are dry, preferably in the shade, the fibre can be cleaned with any of the machines used in hemp or flax breaking.

In Bengal, the retting process lasts from 3 to 30 days, according to the temperature of the water and the mature or immature condition of the stalks. The latter are examined every day, for, in the tropics, more care is needed, as the process proceeds more quickly in the South than in the North. If the jute stalks are insufficiently retted, portions of the woody matter adhere to the fibre and give it a spotted appearance. On the other hand, if they have been over-retted, the fibre is weakened, is darker in colour, and less elastic. Hence a careful watch must be kept on the process.

The native operator, as soon as he finds that the bark is easily detachable from the woody portion of the stalk, steps into the pit and takes as many stalks in his hand as he can hold. Then with a stout stick he strikes the butts, which loosens the bark as far as his hand. He then lays hold of the loose ends, and strips the bark off up to the tip. After stripping a certain quantity, he washes it by striking it on the surface of the water. Then he spreads out the fibre fan-fashion on the water, and picks off any particles of bark which may be adhering to it. The cleaned fibre is then wrung out and hung on lines to dry. The drying takes from 2 to 5 days, according to the state of the weather. The jute is then ready for the spinning-mill. It is made up into hanks and packed in bales for transmission. Every portion of the jute plant can be utilised for some purpose. The leaves and twigs are turned into manure, the peeled stalks into fuel, the roots are either used for paper-making or for fuel, and the silky particles detached in the course of spinning are used in hat-making. If the seed is allowed to ripen, the oil is expressed, and the resulting oilcake is given to cattle.

Attention having been drawn to the discolouration of the fibre during the retting process, attempts have been made to remove the gum, which causes the fibre to cling to the wood, by repeated soakings; but, so far, nothing has come of any invention, unless it may be that one or more of the latest inventions for the cleansing of Ramie fibre can be applied to the cleansing of jute.

PRODUCTION.

Bengal takes the lead in the world's production of jute, as do the United States of America that of cotton, the total annual production of the former amounting to 15,000,000 cwt. or 750,000 tons. But in the same way as cotton-growing has spread over the tropical world, so has the production of jute.

About 1,000,000 acres are devoted to jute culture in the plains of Bengal, and the export of the raw material thence to other countries reaches about 11,000,000 cwt. or more than 98,000 tons, and about 186,000,000 sacks and bags made of jute are also exported, the total value approximately amounting to £5,000,000 for the raw material, and to over £1,000,000 for sacks and manufactured goods. There is an enormous demand all over the world for these sacks and what are here called gunny bags. They are used for wheat, maize, flour, coffee, sugar, saltpetre, silver ore, cotton, wool, and a thousand other products.

These statistics of exports, however, do not represent the total manufacture of jute goods in India. They do not include the millions of gunnies, &c., which leave Indian ports, containing grain or other products, nor those used for home consumption or sent to other parts of India.

For instance, from January to December, 1882, 119,042,771 gunnies were actually made by power looms, of which only 41,523,607 were exported, so that the exports were barely one-third of the number actually manufactured.

The number used in India was 77,519,164, whilst all other countries received but 41,523,607. But, in addition to gunny-bags, India exported last year 12,799,225 yards of gunny-cloth, and this exclusive of the interportal trade, which amounted to 5,728,858 yards, nearly all of which went to Bombay, and another 50,000,000 yards were sent straight up country from the jute mills.

So far as any other civilised country competing with Bengal in the manufacture of sacks, &c., is concerned, there is little likelihood of such competition proving a success. It was tried in California by prison labour, but, notwithstanding the heavy import duty on Indian sacks, the attempt was abortive.

Although it has been proven that jute will grow to perfection in the United States, and also in our own State of Queensland, yet its culture has never taken a more extended form than small patches.

YIELD.

According to official estimates, the average yield of jute in Bengal amounts to about 13 cwt. per acre. Compare this with the yield of cotton. The latter produces on an average 3 cwt. of lint per acre. The expense of producing jute is infinitely less than is required by cotton cultivation. Yet cotton is still king in the United States. The price of jute at the port of Calcutta paid to the grower, after deduction of charges, is from 3 to 4 rupees (4s. 6d. to 6s.) per maund (25 lb.) or from 18s. to 24s. per cwt. The maund, however, is, in India, a variable quantity; an Imperial maund of 40 seers is 81 lb. The price of jute fluctuates very much. In 1884, prices went up to 8 rupees (12s.) per maund (25 lb.); and in the year 1882-83, the price in Dacca fell to 12 annas or 1s. per 25 lb. Scarcity of rain at the sowing season produces a bad crop.

Reverting again to the average yield per acre, I find from Geo. Watt's Dictionary of the Economic Products of India (to which work and to the excellent work by Dr. H. Semler on Tropical Agriculture I am indebted for most of the information contained in this paper) that the average crop of fibre per acre is a little over 15 maunds (375 lb.), but the yield varies considerably, being as high as 30 to 36 maunds (750 to 900 lb.) in some districts, and as low as 3, 6, or 9 maunds (75, 150, or 225 lb.) in others. In the experiments carried out at the Saidapet Farm, Madras, the yield was 599 lb. per acre, if cut close to the ground, and 703 lb. if pulled up by the root—less than a half of the average yield in Bengal.

CONCLUSION.

From what has been stated concerning the jute industry of India, we may form some idea as to whether it would pay Queensland farmers to produce it. As to the cost of cultivation, Mr. Watt says that no trustworthy figures are available as to the cost, but any of our farmers can work out the cost for himself up to the time of harvesting. It would appear that the plant thrives on rich soils. This I can verify from my own experience. Some years ago, I sowed about 6 perches of rich, virgin scrub land, subject to flood, with jute. The plants, which stood thickly together, barely 6 inches apart, ran up to a height of quite 6 feet before beginning to send out branches. Not being at that time much interested in fibres, I rooted them out when they were in flower, and piled them up in a corner of the field. Two or three months later, when I was about to burn them off, I found that they had become well retted, and I obtained a quantity of strong, but dark-coloured, fibre from them. One of my men twisted some fishing lines from it, and the lines were enormously strong. One of these lines, about the thickness of a stout schnapper line, supported a 3-bushel bag of corn or about 180 lb. weight. This will give some idea of the strength of the fibre.

Putting aside any doubt as to the possibility of producing jute fibre in this State, the next point is: In what portion of the State will it reach the greatest perfection? From what we know of the climate of North Queensland, and of its excellent supply of both running and standing water, it would seem that it is in that portion of the country that it would arrive at the greatest perfection. The

rainfall at Geraldton, on the Johnstone River, and that of the Daintree River, where it has lately been stated by an old resident, Mr. Pentzcke, that "cotton rots before it dries," would be conducive to the production of an exceedingly long fibre. Rain is wanted, especially at sowing time; flooded areas of alluvial soil are wanted for successful production, for which a moist heat is also an essential; plenty of water is required for retting. All these desiderata are found in the North. Hence, I infer that jute-growing might become a paying industry for Northern cane farmers.

RICE.

By A. J. BOYD.

Amongst the numerous plants which come under the head of "Grasses" there is one which, like sugar-cane, wheat, and other cereals, produces an article of world-wide consumption, particularly in such Eastern countries as China, Japan, India, the Dutch East Indies, where it forms the staple food of the inhabitants. Rice is of two kinds as to its habit of growth, but these two kinds have in course of cultivation been split up into innumerable varieties. *Oryza sativa*, which is the botanical name of the well-known, so-called common rice, is often considered by botanists to be the one and only rice from which all other varieties are sports. Others maintain that there is a second distinct variety which is not a sport from the former. To this kind of rice the name of *Oryza montana* has been given, but it might just as well be called *sativa*, which means "planted or sown by man." However, we will consider for the purposes of this paper that *O. sativa* is a swamp-loving plant, and hence must be grown in places where the fields can be inundated and dried off at will, and that *O. montana* prefers dry hillsides, or at all events not too wet lowland plains. The so-called swamp rice yields better returns than the mountain rice, but the labour of planting the former causes many growers to give the preference to the latter.

THE SOIL

most suitable for the cultivation of mountain rice is not the same as that required for the swamp variety, but both demand a temperature which can only be obtained in hot climates or in very favoured portions of the temperate zone, although it is well to note that mountain or uplands rice will thrive in a much cooler climate than the swamp rice. In fact, it may be said that where the cultivation of the latter ends that of the former begins; that is to say, that when the swamp rice fields reach the base of the hills, or up to an elevation of 3,000 feet, the cultivation of the uplands begins and continues to a height of 5,000 feet. In Java, rice gives full returns at an elevation of 3,500 feet. The soil best adapted to rice culture should be of a sandy-loamy nature, containing all the constituents required for the production of other cereals.

As regards swamp rice, it is not at all likely that its cultivation will ever be undertaken in Queensland, for many reasons. Such are: The planting out of rice plants from a seed bed necessitates standing almost knee-deep in mud, and the subsequent weeding must all be done by hand by men and women paddling about in mud and water. When the seed is sown broadcast, the sower must plunge through the mud, as horses and a seed drill cannot be used. As the plants grow, the land must be kept in a constant state of flood, only the tops of the rice plants being above water. This flooding lasts until flowering time, after which the land is alternately flooded and dried off until the grain is well formed and the dark-green colour of the ears changes to yellow. As soon as this occurs, the land is dried, and the crop harvested. All this means a plentiful supply of water, but even where this is to be found it is almost certain that no white men would be found willing to work at swamp rice-growing except at such an exorbitant wage as would render its cultivation unprofitable.

Thus, the Queensland farmer, so far, is limited to the production of mountain rice. Will it pay him to grow it? The experience gained, both in the extreme North and South of the State, will answer the question. For several years rice was grown in the Logan district, and an enterprising German settler put up a mill for husking the "paddy"—as rice in the husk is termed. Owing to the unsuitable varieties planted, the rice industry did not prove a success, so far as grain was concerned, but it continued to be grown as fodder for cattle.

Notwithstanding the discouraging results, it had been amply demonstrated that the soil and climate were suitable for rice culture, and that, given the right kind of seed and proper cultivation and manipulation of the crop, the production of rice would prove a paying industry. It had also been found that the cereal could be grown with excellent results in the Far North, in the neighbourhood of Cairns. The right seed having at last been obtained by the Department of Agriculture, rice-growing began both in the North and South on a fairly large scale. The "White Java," which yields a plump grain, is rust-free, and has a straw from 4 to 6 feet long with a good flag, was the variety most in favour.

PREPARATION OF THE LAND.

The ordinary method of preparing land for wheat or maize culture is adopted for rice. When the soil has been reduced to a fine tilth, the seed is sown at the end of September or at the beginning of October, when the early rains may be expected. Where the crop is to be sown on a hillside or on sloping land, a kind of terracing must be adopted, so as to catch and retain a certain amount of water, which would otherwise drain away too quickly, for even mountain rice demands a certain amount of moisture, and the requisite quantity can be secured by making a slight open catchment drain on the upper side of the terrace. The minimum amount of rainfall for successful rice culture should not be less than from 25 to 30 inches.

SOWING THE SEED.

Paddy, or rice seed, may be sown either broadcast or in drills. Transplanting from a seed bed is such a laborious and slow operation that it will not here be considered. In sowing broadcast, about 60 lb. of seed per acre are needed, but if drilled in about from 30 to 40 lb. are sufficient. The drills should be drawn from 2 feet 6 inches to 3 feet apart, and the drill so set that the seeds will drop about 12 inches apart. These distances afford convenience for keeping the crop clean until the plants are sufficiently high to stop the exuberant growth of weeds by covering the ground and overshadowing them.

HARVESTING.

When the crop is ready for harvesting, the stalks are still fairly green, and the heads are of a golden-brown colour, and droop gracefully. Cutting should not be deferred until the grain is dead-ripe, as great loss from shaking-out will be the result. As soon as the dew has dried off in the morning, cutting may begin, the rice being bound in small sheaves. The crop should not be stooked in the field like other cereals. All operations with rice require to be carried out quickly. As soon as cut, it should be carted to the shed or barn, and, if not dry enough, be spread out for a day or so to ripen. Should the crop, however, have been cut at precisely the right time, it may be threshed at once. Where only small areas are grown, the farmer can make a simple contrivance such as is described by Mr. F. Peek as being in use in the Pimpama district. It consists of four stout forks driven into the ground at 10 feet distance in length and 4 or 5 in width. Two saplings are placed lengthways on the forks, and two crossways. From these depends a sheet or tarpaulin, forming a sort of trough. In the centre a rough kind of ladder is placed, running from end to end. The bundles of rice are beaten over this, and the grain drops into the canvas trough. This grain is known as "paddy." After threshing in this

fashion and winnowing, the paddy is spread out in the sun to allow it to get thoroughly dry. The straw contains a large amount of nutriment, and hence makes excellent fodder for stock.

MILLING.

As soon as the paddy is ready to be prepared for market, the next process is to pass it through a "huller and polisher." This machine, revolving at high speed, takes off the hulls or outer brown covering of the paddy, and polishes the grain at the same time. From this place it passes to a grading machine, which separates the broken grain, and turns out three different qualities of polished rice. After this, it is again winnowed to drive off all dust, particles of hulls, &c., and the clean finished product is then ready for market.

THE YIELD.

Given suitable conditions of soil, rainfall, and proper preparation of the ground, the yield of rice in Queensland runs from 30 bushels up to 60 bushels per acre of paddy, and even much higher returns have been obtained in Queensland. The yield of straw is from 3 to 4 tons per acre. The value of the paddy is from 4s. to 5s. per bushel, delivered at the rice-mills. The straw is worth from £2 to £3 per ton. In some districts where there is no frost two crops may be harvested in twelve months.

To produce 1 ton of marketable rice $1\frac{1}{2}$ tons of paddy are required. The resulting pollard is worth about £2 per ton as feed for calves, pigs, and poultry.

Japan rice is worth £24 per ton, and Rangoon, the poorest quality imported, is worth £19 per ton, duty paid. The Queensland miller could well afford to sell at £18 per ton and make a good profit.

The cost of the necessary milling machinery, exclusive of driving power, is £130 for machinery having a capacity of 10 cwt. per day.

In 1898 the average yield per acre throughout the State was over 44 bushels. In 1893 there were 789 acres under rice cultivation. In 1900 only 319 acres were sown, producing 9,275 bushels of paddy, equal to 320,617 lb. of clean rice.

The great drought brought the rice-growing industry to its lowest ebb. In 1902 only 38 acres were sown, and I believe the crop was entirely lost owing to drought. A great deal of rice was produced in the Far North, in the neighbourhood of Cairns, where there are two large rice-mills. The extreme South appears to suit the cereal, and it is here that very large yields have been recorded. There is a good mill in this part of the State.

There are evidences that rice will again become a favourite crop in this State, more especially as many sugar-growers are turning their attention to subsidiary crops. Rice is a better-paying crop than wheat, and will yield rich returns in districts where wheat cannot be grown. The bulk of the paddy for seed raised in the State was sold at 6s. per bushel, and the clean rice sold on the market at £18 10s. per ton.

Rice is extensively grown in the United States of America. About 400,000,000 lb. per annum are raised there. The price of land suitable for rice has risen from £2 to £8 per acre, and in Texas and Louisiana the worthless lands of these two States produce such quantities of rice that in a very few years they alone will produce all the world's demand for the article. In Queensland there are infinitely greater inducements for farmers to take up its cultivation vigorously.

VALUABLE SUGAR-CANES.

Mr. R. M. Shannon, Barthalla, Mackay, writes:—

In the May number of the *Queensland Agricultural Journal* (page 361), under the heading "Valuable Sugar-canes," you publish some interesting figures, with a commendatory reference to sugar-canes B 147 and B 208. My experience with these canes may help others to give theirs, so I have

pleasure in giving it. With me, B 147 is about the very worst cane that a farmer could try to grow. It seems to be absolutely without any constitution, and I have persevered with it since January, 1901, when two sets arrived here from the Queensland Acclimatisation Society. Another cane which appears also to be lacking in constitution, and subject to what Dr. Maxwell would call "chlorosis," is B 208.

Of the canes mentioned in your notice, D 145 is a most satisfactory cane, a robust luxuriant grower, and not either given to arrowing or shooting at the eyes; it does not appear, however, to be a good ratoon cane. D 115 is also most satisfactory, very like the old Rose Bamboo, except that it grows very straight from the stool, something like the Daniel Dupont family. D 116 is also satisfactory, but all the B (or Barbados) seedlings are unsatisfactory with me.

I append copy of analysis copy of analysis made 3rd November, 1903, at Mackay Sugar Experiment Station:—

Name of Cane.	° Brix or Total Solids.	% Sugar in Juice.	Quotient of Purity.
D 115	20.1	17.65	87.8
D 116	20.3	18.91	93.1
D 306	21.0	19.79	94.2
D 145	19.4	17.85	92.0

For the sake of comparison, the following canes were also treated:—

Rose Bamboo ...	20.5	19.55	95.2
New Guinea XXII.	22.3	20.74	93
New Guinea XXIV.	20.5	19.25	93.9
Otamite	20.3	18.65	91.8

I was so disgusted with B 147 and B 208 that I did not think them worthy of analysis; for, however high grade a cane might be in sugar content, if it dies out in the paddock it is not worthy of serious consideration. The analysis of canes above is valuable as a comparative test only. The sticks were taken from a series of lines growing side by side under exactly similar conditions—plant cane planted in August of 1902, and cut 1st November, 1903, and yielding about 35 tons to the acre right through the piece.

I should much like to get some other growers' experience of the new canes.

A SIMPLE METHOD OF FORECASTING THE WEATHER.

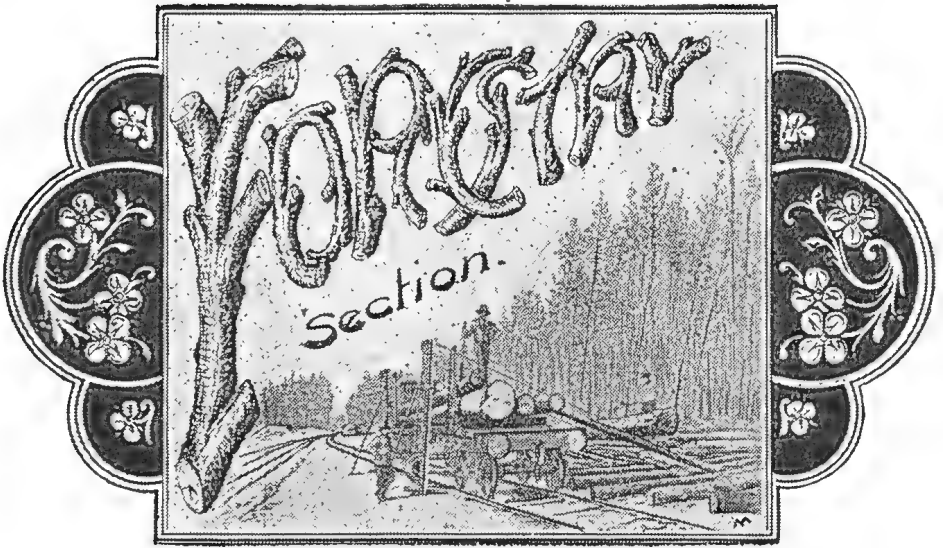
At such a season as the present, when the question is so often asked, "How's the glass?" I thought, writes a correspondent of the *Australian Field*, that it would not be out of place to mention how easy it is to make a reliable weather glass, and to become an authority on the weather.

Get a common glass pickle-bottle, and fill with water to within about 2 inches of the top. Next obtain a salad oil flask, and, after taking off the wicker and well cleaning, place the oil flask mouth downwards into the pickle-bottle.

The water in the neck of the oil flask will rise or fall according to the weather. Should the water in the flask rise, it will indicate fine; when the water is entirely out of the flask, one may look for very wet weather; and, when the water in the neck of the flask rises above the water in the pickle-bottle, it indicates "set fair."

I have during the past summer placed two of these glasses by the side of my barometer, and have carefully compared them; and while the barometer has been cutting lively capers, my water glasses have been far more sedate, and on the whole more reliable. When a decided change has been coming, the water has gone either up or down steadily.

I believe most town dwellers are ignorant of the existence of this simple contrivance, although it is a very old idea, and is largely used in this district.



CONDUCTED BY PHILIP MAC MAHON, Director Botanic Gardens, Brisbane.

FOREST PROTECTION.

"Forestry is the preservation of the forests by wise use." This splendid definition of forestry was first used by President Roosevelt in his first Message to Congress, in which he outlined a forest policy to protect and replenish the depleted forests of his country. Just a year ago he repeated the phrase in an address to the Society of American Foresters, adding:—"Keep that definition in mind. You can start prosperous homes by destroying the forests, but you cannot keep them prosperous in that way."

When "forestry" is mentioned, many people assume that the forester desires to enter on some Quixotic project of covering the face of the country with young plantations at vast expense. He does not advocate anything of the kind. What he wishes is, that the forest wealth of the country shall be regarded as a crop of which the matured portions shall be used in such a systematic way as to ensure the perpetual reproduction of the crop under such conditions as to secure a regular and unfailing supply of timber of the highest quality, and which will be available for the mill and for export, and cut up with the least possible waste. Land unsuited for agriculture—land upon which the selector could not make a living, strive he never so manfully—would, if properly utilised, become a source of national wealth. Such land will often grow splendid timber at practically no cost. No crop requires less from the land. The massive tree, which, as it lies on the logway of the sawmiller, inspires a feeling of respect because of its imposing solidity, is made up almost entirely of an aerial substance through which you can pass your hand. This it procures from the air and not from the earth; and the tree repays the earth for its standing-room by littering it with falling leaves, and to ages of this manuring our scrub lands owe much of their fertility.

It is, of course, the forester's business to plant when circumstances demand, or when the economic conditions are such as to justify it. His main business, however, is to grow the crop which Nature has planted, to harvest it, to utilise it, and to assist her to plant another and yet another crop, each more well ordered than the last. The greatest yield of timber from the smallest area of land and at the very minimum of cost are what he must strive for. The forester is a gardener on a huge scale: his garden is a State, his season is a century, and he must think in provinces. Some of the Australian States have already reached the stage in which the neglect of the first principle of forestry has compelled recourse to the second and more expensive one, and planting has become

essential. All the States are fast hurrying to this preventible condition. The timber-getter is usually credited with a desire only to destroy, but this is not at all a fair conclusion. Constant communion with the forest most frequently makes the dweller in its depths a very observant and deeply reflective man. I was greatly struck at the startling consensus of opinion expressed by both timber getters and millers at the recent Timber Conference—that the easily accessible forests of the State were, to use a well-understood mining term, rapidly “petering out,” with no hope of replacement.

Every Australian State imports timber from Europe and America. In New South Wales alone this import amounts to about half a million pounds sterling per annum. Think of the wages this means! The timber so imported consists mainly of softwoods, such as the Forest Departments of Norway, Sweden, and Russia have been conserving and planting. But it has been clearly proven that Australia can produce softwoods second to none in the world. The colonial pine of Queensland and New South Wales, the kauri pine, the red cedar, and other valuable softwoods have been cleared, not only for the sake of the matured timber, which is right, but in such a way and with such a neglect of all sylvicultural requirements as to make their renewal an impossibility. Now people in the denuded districts talk in a light and airy way about replanting, as if a magic wand could be stretched forth and trees made to spring up where it pointed.

The object of this section of the *Journal* is to promote discussion and to elicit information on the subject of our trees and forests—their uses, influences, systematic management, sylvicultural and aboricultural requirements. Trees are our theme, whether they are found in the thickly serried timber forest, the open park, the wood-lot of the farmer, the shelter paddock of the grazier, or extending their shade and shelter to the hurrying denizen of the crowded town. Experiences and opinions will be most thankfully received from all lovers of trees, and from those engaged in their culture, harvesting, or conversion.

Apropos of the statement that protection is the first line of defence of the scientific forester, I give below a brief Report written by me at the request of the Queensland Minister for Lands fifteen years ago, and presented to Parliament. Since that time one-fifth of the rotation period of a Queensland forest has passed away. Trees which were then poles or saplings have now become far advanced on the way to maturity—that is, if they have been permitted to survive. Every year they are collecting, at an accelerating rate, wealth for the State from the surrounding air. Many have been quite needlessly destroyed without one farthing's advantage to any human being. The Report was purposely brief to secure the attention of the busy parliamentarian, and omitted detailed mention of all the machinery which goes to the building up of a modern forest policy, but it shows that “preservation by wise use,” to again quote the definition of the Forester-President Roosevelt, was the keynote of my appeal.

Some of my recommendations have been carried out; others, such as the classification of timber, were suggested quite independently by practical timber getters and millers at the Conference; while my remarks on indiscriminate and unsystematic planting were also independently supported by at least one practical gentleman, who had probably never read the Report, but experimented for himself:—

CONSERVATION OF FORESTS IN QUEENSLAND.

PRELIMINARY.—In presenting a report upon the subject of forest conservancy in Queensland, I have taken it for granted that the Minister for Public Lands acknowledges the necessity for the establishment of such a system, that the Department of Agriculture is already in possession of facts and figures in connection with the working of such systems in India and elsewhere, and that I am simply required to deal as briefly as possible with the special requirements of Queensland in this respect, and to outline such a plan as would, with possible modifications, meet the needs of the case, taking into account the sparseness of population, the comparative smallness of the revenue to be derived in the first stages of the scheme, and other circumstances.

EXTENSIVE PLANTING NOT DESIRABLE AT PRESENT.—Before going further, I must say that although I am fully convinced of the great good which will result from a system of Forest Conservancy, carried out upon natural lines, I cannot endorse the views of those who advocate an immediate and extensive system of reafforesting denuded areas by what may be called artificial means. This, to be done with any prospect of success, must be done well, and the expense would be enormous without any prospect of return in the near future. Such a system, if attempted in Queensland under existing conditions, could only result in a dismal failure, which would do much to throw discredit on Forestry generally, and be productive of more harm than good.

SYSTEM REQUIRED.—The system of Forestry, or rather planting, in use for the purpose of providing with trees certain unforested portions of Europe and America is altogether unsuited for adoption in this country. The basis of conservancy in Queensland for some years to come, and indeed its backbone for all time, must be the management of sufficient portions of her natural forests in such a way as, while allowing them to be used for the purposes of life, will secure a perpetual succession of mature, healthy, and marketable timber. From this source will be derived a revenue which would never be derived from the forests were the existing conditions allowed to continue, and the natural destination of at least a portion of this revenue will be to reafforest areas which may require it, and which need never have been denuded had a watchful care been exercised over the forests by someone skilled in such matters for the past few years. These reafforested areas will in their turn be productive of revenue, but I strongly deprecate any immediate attempt at extensive reafforesting at the public expense, and still more strongly the expenditure of money on isolated plantations, without scientific supervision—the manager in each case working for his own hand and according to his own ideas, which may be very crude ones, and without plan or organisation. This was tried at one time in Victoria; its results were *nil*.

STEPS TO BE TAKEN.—I am of opinion that the first steps to be taken are—

1. The appointment of a Conservator of Forests.
2. The selection and reservation, by means of the above officer, of certain areas of natural forest as a basis of operations. The selection of these State forests would have an important bearing upon the future fate of the forest scheme.

OVER-RESERVATION CONDEMNED.—It cannot be too clearly known that over-reservation is in its effects nearly as bad as no reservation at all. When a tree reaches a certain stage, good forestry requires that it be cut; so that the idea is not to lock these forests up; on the contrary, large portions of them would always be available for the purpose of the timber-getter, but a rotation would be established which would give the young plants in the unused blocks time to establish themselves firmly, and under natural conditions, before the operations of the lumberman again began in their vicinity.

A FORESTER IN CHARGE OF EACH PRINCIPAL STATE FOREST.—In each principal State forest (of which only a very few would be at first selected) a forester would be necessary. An active man with a knowledge of gardening, propagating, and bush work would meet all present requirements. His duties would consist in following the directions received from the Conservator as to the rotation of blocks, the allotment of the timber to be cut, the rearing in forest nurseries of young plants, &c. He would have general control of his forest and any subsidiary reserves in his district, and would be required to report any breaches of the Forest Regulations, and as far as possible prevent same with the assistance of the police, Crown Lands bailiffs, &c.

FOREST NURSERIES.—The foresters in charge of certain State forests would be charged with the duty of forming nurseries in certain parts of the forests themselves, where the young trees, with which every Queensland forest naturally abounds, can be transplanted, or where the seed can be sown under

natural conditions according to the nature of the tree. It is not generally known, even by people whose business takes them much into the forest, that the seeds of many forest trees, especially those of Australia, are so irregular in their periods of germination as to be liable to greatly disappoint the cultivator when grown on the ordinary garden nursery system. A young tree absolutely requires the recently formed humus of its native forest to give it such a start in life as will enable it to make a valuable timber tree. In the formation of some nurseries, I am informed, the ground was trenched, the humus being buried out of reach of the young rootlets; this meant expense and inefficiency.

It would, I believe, be possible to employ in several instances two or three aborigines in connection with each nursery to collect the young seedlings in the forest, where they spring up in thousands in certain spots, often at most irregular intervals. This applies to some of the more valuable of the Queensland timbers. No planting should be undertaken without a good stock of vigorous healthy plants, which these nurseries would supply in required quantities.

TREES FOR PUBLIC PLANTING IN STREETS, ETC.—From the nurseries above referred to, Divisional Boards, State schools, Municipalities, and other public bodies, as well as approved private persons, could procure useful trees to plant by roadsides, in school reserves, public places and streets, &c., in any desired quantity.

THE BONUS SYSTEM.—A great deal has been said and written upon the bonus system in force in South Australia, whereby the sum of £2 per acre in land warrants is paid to every cultivator of trees, and its introduction has been spoken of. I believe that an introduction of this system is altogether unnecessary here. It possesses certain advantages in an almost treeless country; but if the conservation of our abundant forest wealth be taken in hand in time—that is to say, now—the necessity for such an expedient will never arise in Queensland.

INFLUENCE OF FORESTS ON CLIMATE AND GENERAL AGRICULTURE.—I need not trouble you with my reasons (which would fill a volume) for arriving at the conclusion that in every country, and nowhere more than in Queensland, the interests of the cultivators of the soil are closely identified with the question of forest conservancy. I hold with nearly every student of the subject, that forests exercise an important influence upon climate, and I have had the most convincing experience of the advantages of forests upon river watersheds in mitigating the effects of floods and equalising the distribution of water over the plains and agricultural districts.

FORESTS ON WATERSHEDS SHOULD BE CONSERVED.—I am strongly of opinion that in Queensland, more than in most other countries, there exists a necessity for the conservation of forests upon the watersheds of our rivers for climatic purposes, and that reserves should be established in such places as soon as possible.

CHARACTER OF FORESTS TO BE RESERVED.—It is most important that the forests which would first come under the operation of the Forest Department should be those which possess good timber, and which, owing to their vicinity to centres of population, railways, &c., are most easily worked—

- 1st. Because they are in more immediate danger of denudation than other forests, and consequently need protection more.
- 2nd. Because a start would be then afforded the Department in procuring a revenue to meet its present requirements and future extension under the sanction of the Minister.

EXTENT AND POSITIONS OF RESERVES.—The determination of the extent and positions of the reserves would form one of the first duties of the conservator, by actual examination of the country. Although I have carefully studied nearly every source of information upon the subject, and have of course arrived

at certain general conclusions, I hesitate to place them upon record when they might be seriously modified by a personal examination.

SYSTEMS OF TIMBER SALES.—The following systems of disposing of timber might be employed:—

1. By license, applied as now to the waste timber lands of the Crown, and where supervision is not available.
2. By block, whereby the mature timber on a certain defined block is sold by contract or auction.
3. By sale of mature timber, divided into 1st, 2nd, and 3rd class, at per tree, to be marked by a forest officer.
4. By sale of timber at per hundred feet or cubic foot (royalty), 1st, 2nd, and 3rd class.
5. Sale of thinnings for scaffold poles, and of shingles, &c., at per 1,000, or as might be arranged.
6. Sale of firewood, on special firewood reserves in vicinity of towns.

Any of the above methods might be applied to any State forest or portion thereof as the circumstances of the case might demand.

REVENUE.—A sum should be voted each year by Parliament for the administration of the Department.

All sums received under the following heads in the reserves under the control of the Department should be paid into the Exchequer in the ordinary way and credited to the Department—

1. Grazing fees.
2. Royalties, sales of timber, thinnings, firewood, &c.
3. Leases for mill and other sites.
4. Sales of gravel, sand, or other material from reserves.

The operations of forestry extending as they do over years instead of seasons, it would not be reasonable to expect a large revenue in the earlier stages of any system which would be adopted, but it may be confidently expected that in the course of a few years receipts will much more than cover expenses, and that, taking a series of years, the result will be an actual profit on the whole operations, leaving out of account the vast stores of valuable timber every year increasing in value. It would be easy to enter into elaborate calculations showing what revenue might be expected to accrue, but, though seemingly most accurate, these calculations are liable to so many disturbing influences that they are the merest guesses at the truth and useless as practical guides.

DIVISIONS OF FOREST RESERVES.—The reserves might with advantage be divided into—

1. State Forests.—These would not at first be numerous. I would make each the centre of a group or division of reserves. Other reserves as improved would gradually assume the position of State forests, so far as might be deemed expedient from time to time.
2. Timber Reserves.—These would consist of those reserves upon which it would not be possible to employ at first such strict supervision as in State forests, but which it would be desirable to bring under control.
3. Township or Firewood Reserves.—These would consist of the nearly denuded forests, or portions of them, in the vicinity of towns, from which certain classes of timber might be cut as firewood, &c. By this means, while useful to the town and producing some small revenue, the exhausted forests would be gradually filled with good timber.

4. Mining Timber Reserves.—These would be reserves, usually of a temporary character (in the case of mines not themselves very permanent), to regulate the cutting of timber for mining purposes, and to keep up a constant supply of the proper kinds. The neglect of this precaution has led to the closing of mines in Victoria, the long carriage of timber being a very serious difficulty and expense.
5. Plantation Reserves.—In the earlier stages of forest conservancy here it would, as already stated, be unwise to attempt to plant largely, but there are positions in which it might be most desirable to establish forests or plantations, and those areas could be reserved with greater advantage at an early date than at a later period.

AGRICULTURAL SETTLEMENT NOT INTERFERED WITH.—It would be the duty of the officer selecting these reserves to do so in such a way as to interfere as little as possible with agricultural settlement.

FOREST CONSERVANCY STAFF.—The strength of the staff would, of course, depend upon the sum voted, and might depend upon the arrangements made by the Minister for filling the principal position thereon. A commencement might be made with the following:—

1. Conservator of Forests.
2. Assistant.
3. Foresters (say four to commence).
4. A varying number of labourers, the number being necessarily limited at first, and a few boys who would or might be at first taught propagation, &c., at the Botanic Gardens, or at forest nurseries, and thus fitted to take higher positions.

EXPENSE.—The expense of carrying out the idea of which the above is a brief outline would depend upon what arrangements the Minister might make as to the *personnel* of the staff, &c. I estimate that a fair commencement might be made with, say, £2,000 for the first year or two. The expenditure of the South Australian Forest Department averaged in the first years of its existence £5,800; but a good deal could be done for the first-named sum.

FOREST PROTECTION BOARDS.—I would advocate the formation, as an honorary office, of Forest Protection Boards in outlying districts throughout the country. Such bodies would be of great service in the work of conservation.

The necessity for keeping this Report within limits has prevented me from touching on many interesting details which would form a part of the business of the conservator and the forest staff.

FOREST CHIPS.

OUR HEADING.

The illustration at the head of this section is adapted from Schlich's "Manual of Forestry." It illustrates the connection between up-to-date forestry and the opening up of country to progressive development by light railways. The true forester is not the antagonist of the agriculturist, but his friend and helper. Germany, with her huge and prosperous agricultural system, has 26 per cent. of her total area under forest, and of this area 33 per cent. is worked by the State as a perennial crop. Yet Germany finds it necessary for her industrial needs to import £14,800,000 worth of timber every year over and above the value of all timber exported by her.

TEAK PLANTING IN BURMA.

In Burma, teak-planting operations are mostly carried out, at the instance of the Government, by the native cultivators, who plant the young teak in their rice fields when the rice crop is put in, and receive from Government a certain sum for every 100 plants alive when the rice has been harvested. The trees are planted in lines. The lines are 9 feet apart, and

the trees are 4 feet apart in the lines. Thus 1,210 plants go to the acre. The natives then clear another space for cultivation, and are now only too glad to plant teak, though they strongly objected at first. In about the third year the branches of the young trees meet, and leaf-canopy is formed. The young forest is then safe. In about twenty years the trees are from 70 to 75 feet high in many cases. Up to 1898, 52,321 acres had been so planted, and the work is steadily extending. Teak grows naturally in a matrix of other timber, like most of our eucalypts, but this cheap method of producing pure forest is meeting with astonishing success. The system of selection and improvement fellings in rotation blocks will be always, however, the mainstay of Burmese forestry.

A NOTABLE FORESTER.

Mr. Gifford Pinchot, Forester to the United States Government, is a remarkable instance of enthusiasm. Born to much wealth, he might have drifted through life in the aimless fashion which too often marks the career of the young man of fortune. But he travelled abroad, and studied forestry in Europe and India; then he managed a forest estate for Mr. George Vanderbilt; and, finally, was appointed Forester to the Government of the United States. He and his family have handed over £30,000 to an American university to endow a Chair of Forestry; and the recent awakening to forestry in America, where it is now taught at about fifty universities, public schools, and other institutions, is largely due to his enthusiastic energy. As usual, the necessity has produced the man.

THE FOREST RESOURCES OF AUSTRALIA AVAILABLE FOR BRITISH COMMERCE.*

By E. T. SCAMMELL, F.R.G.S., formerly Commercial Representative for the West Australian Government.

One of the most important duties requiring the early attention of the Federal Government of Australia is that of dealing with the forest resources of the Commonwealth. At present the forest laws and regulations in force, according to the opinion of the Victorian Royal Commission on Forestry, 1901, are "weak, unsystematic, and inefficient." This has been acknowledged at different times by the various Governments of the Australian States, and desultory efforts to introduce some scheme of State regulation have been made, but no scientific and comprehensive plan, on the lines laid down by France, Germany, or British India, has apparently been seriously considered, or, at any rate, attempted. Referring to the need of forest conservation and management in Greater Britain, Professor Schlich says: "Surely the time has come, or, rather, it came some time ago, for a more vigorous forest policy on sensible lines throughout the Empire. Let us strive to introduce systematic forest management, more particularly into Canada and Australasia. The question is no doubt beset by great difficulties, but where there is a will there is also a way. Above all, let the self-governing colonies consider the magnificent example which has been set them by India, where the preservation of the State forests has now been put on a safe basis, for the everlasting benefit of the people of the country and the Indian exchequer. Humboldt says that 'men in all climates'—by the indiscriminate felling of trees—'prepare at once two calamities for future generations—a want of wood and a scarcity of water.' In order to avoid these calamities, which will as surely fall upon the New World as the old, unless prevented by wise and timely action, it is incumbent upon British Colonial Governments to give the question of forest control and development their most careful and enlightened consideration."

I am glad to know that the labours of the Victorian Commission have resulted in a strong recommendation being made to the effect that the action of the Government of India should be followed by the Legislatures of Australia.

* Read before the British Association at Southport, 1903.

It is satisfactory also to note that the Western Australian Government have lately appointed a commission for the purpose of obtaining information and of recommending measures for dealing with the forests of that State, while New South Wales and Queensland are considering proposals having similar objects in view. The way, therefore, is being prepared for concerted action on the part of the Federal Government, by co-ordinating, as far as may be possible, the efforts that are being made by the various States of the Commonwealth, and by advising the adoption of measures which, while applicable to the separate States, shall be suitable to the country at large.

THE FOREST AREAS OF AUSTRALIA.

The magnitude and importance of the interests involved may be judged by the fact that the forest areas of Australia comprise 107,037,000 acres of marketable timber, or nearly half the areas of the forest lands of Europe, excluding Russia. Of this area Queensland possesses 40,000,000 acres, New South Wales 20,000,000, Victoria 12,000,000, South Australia 4,000,000, Western Australia 20,000,000, and Tasmania 11,000,000 acres. To this should be added a considerable area in Queensland (over 100,000,000 acres) and in Western Australia (over 70,000,000 acres) covered with inferior timber, which has a local value for building and for general purposes.

Many, if not most, of the important forests of Australia are fairly accessible from the sea, as the best grown and most valuable timbers are mainly coastal. This especially applies to the belts of jarrah and karri in Western Australia, which occupy clearly-marked and distinct areas on the hill ranges of the south-west, which skirt the coast for some hundreds of miles; and also to Tasmania, whose forests of blue gum and stringy bark grow down to the shores of that forest-clad island. In Victoria the southern forests, which correspond very largely to those of Tasmania, are not far from the sea, while in the northern part of the State, where the timber is akin to that of New South Wales and Queensland, considerable areas border on the river Murray. The sub-alpine regions of Victoria, however, where some of the finest timber of that State is found, are at present practically inaccessible. In New South Wales and Queensland a number of the largest and most valuable belts of forest land lie between the dividing range and the sea; but in both these States there are large areas too far from the coast to render them serviceable as immediate sources of supply.

THE COMMERCIAL TIMBERS OF AUSTRALIA.

The timbers of the Commonwealth are of many varieties, and some of them of high commercial value. The chief of these, as shown in the great work of the late Professor Baron von Mueller, are the eucalypts, which the indigenous to Australia, and are found in all parts of the country. Of this valuable timber alone there are over 150 species. Besides the eucalypts, there are many kinds of casuarinas (the Australian oak), some conifers (the Moreton Bay pine), the cypress pine, the brown pine or colonial deal, and others, many acacias (the Australian wattle), banksias, and numerous other varieties.

At present, however, the range of Australian woods available for British commerce is limited. Western Australia and Tasmania are the only States that have seriously dealt with the question of exporting timber, or of using their forest resources as a valuable commercial asset. New South Wales is beginning to enter the field, and Queensland should be able to utilise her timbers for the supply of outside markets. But before these States can hope to compete with Western Australia or Tasmania, or in any way to command the attention of timber users in this country, they must issue, under authority, a definite and reliable statement of the timbers available for export. General statements on the subject—of which the Government books are full—are of no practical use, nor are the tests, proving the strength and general value of the timbers, such as those issued by the Queensland and New South Wales Governments, unless accompanied by reliable data as to the timber actually available. For example, two of the most useful eucalypts of Australia—ironbark and

tallow wood—to which special attention has recently been called by the New South Wales Government, are said to be so restricted as to render an export trade of any magnitude impossible. There are, however, other varieties of timber in New South Wales and Queensland, of which there should be an ample supply. In the case of Victoria and South Australia, notwithstanding the proposed efforts to conserve and increase the forest resources of these States, there is little probability of any export trade in timber being possible for many years to come. Our attention, therefore, for the purpose of this paper, must be confined, practically, to Western Australia and Tasmania.

WESTERN AUSTRALIA.

The leading timbers of this State are the well-known jarrah (*Eucalyptus marginata*) and karri (*Eucalyptus diversicolor*), which occupy a computed area of 8,000,000 and 1,200,000 acres respectively in the south-western district. The average size of matured jarrah trees is from 90 to 120 feet in height, and from 3 to 5 feet in diameter. The stems are straight and clean, and rise 50 to 60 feet without a branch. Karri is a still finer tree, its height averaging 200 feet, diameter 4 to 6 feet, and its stem rises branchless from 120 to 150 feet. The colour of the matured woods is red, and it is difficult, even for experts, to tell from the material itself the difference between them. The usual test is by burning, when jarrah is found to leave (ordinarily) a black clinker, and karri a white ash. Both timbers are largely used for harbours and dock purposes, railway sleepers and wagons, and street paving. For structural works karri is preferred, as it possesses greater lateral strength than jarrah. But for general uses jarrah is (locally) in much greater demand, and is esteemed the better wood. These timbers, when sound, possess, in common with some other Australian woods, great immunity from the attacks of marine and land insects, and are comparatively non-inflammable. The former characteristic renders them suitable for sea-work of every kind and for use in damp ground, while the latter renders them useful as a fire-resisting material, on account of which, I understand, an order has recently been placed for karri sleepers for the Baker Street to Waterloo tube railway by the Underground Electric Railways Company of London, Limited. The durability of karri and jarrah is universally recognised. Samples of timber which had been in use for piers and railways and for underground work for many years (such as those shown at recent exhibitions in Paris, Glasgow, and London) prove that they compare favourably with the best hardwoods of the world. The usefulness of these woods for street paving in this country is also well known.

Of the other timbers of this State available for export, tuart (*Eucalyptus gomphocephala*) occupies the first place. This timber, in strength and toughness, is one of the best, if not the best, of all Australian woods. But the limited area it occupies renders a large export trade in it impracticable. Red gum (*Eucalyptus calophylla*) is a strong and useful wood, and has a very wide range. It requires, however, to be carefully selected, as it is often marred by numerous veins. These, however, exude a gum which possesses important medicinal properties, and is used locally for tanning. The term "red gum" is common to many Australian eucalypts, particularly to the *Eucalyptus rostrata* of Victoria and the *Eucalyptus resinifera* of New South Wales. Wandoo (*Eucalyptus redunca*) is a wood that needs to be better known. It covers a considerable area, and it is computed that there are from 6 to 7 million loads of marketable timber available for use or export. It is well suited for railway and wheelwright work. York gum (*Eucalyptus loxophleba*), another widely-distributed timber, is a strong, tough wood, suited for general purposes. The same also may be said of the yate gum (*Eucalyptus cornuta*) and other eucalypts of this nature, of which this State and Australia generally possess a great variety. The *Acacia saligna* (a species of wattle) supplies a valuable tannic acid—mimosa tannin—of which the bark contains about 30 per cent. The well-known raspberry jam (*Acacia acuminata*) is a beautiful wood, suitable for cabinet work. Another acacia, the badjong (*Acacia microbotrya*), is used

for barrel staves and soft-wood joinery. There are many other timbers in this State—casuarinas, banksias, and conifers—suitable for building, furniture, and fancy work, which are available for export.

TASMANIA.

The most important and best known tree of the Tasmanian forests is the blue gum (*Eucalyptus globulus*). Its name is derived from the colour of the young growth. In size it compares with jarrah and karri. The colour of the matured wood is golden-yellow to purplish-brown or buff. It is in considerable demand for harbour works. Good piles, like those supplied for the national harbour works at Dover, can be obtained up to 100 feet in length, with only a moderate taper. It has been tried for street paving in London, though with only moderate success. If sound and well selected, blue gum is one of the most important and valuable trees of Australia, and, according to recent reports by the Government of Tasmania, is available in any quantities. On account of its rapid growth, and the pungent and odorous exhalations from its leaves, it has been widely planted in Southern Europe, particularly in malarial districts, with most beneficial results. In South Africa, India, and particularly in the Southern and Western States of America, extensive plantations of blue gum have been made. In a report on "Eucalypts Cultivated in the United States," issued by the United States Department of Agriculture, 1902, this tree is described as the best all-round eucalypt. As an illustration of its use for harbour purposes, the report states that a contractor, who was constructing a pier at Oceanside (California), required a few piles of Oregon timber to complete his contract. As these were not, for the moment, to be had, he obtained from a neighbouring plantation some piles of blue gum. When it became necessary, some years later, to repair the pier, these were found to be the only sound piles in the structure. "The demand for these piles," the report states, "is now greater than the groves of eucalyptus can supply."

Stringy bark (*Eucalyptus obliqua*) is a more widely distributed tree than blue gum. It attains an immense size. The timber varies considerably, according to the situation and soil in which it grows. It is used for similar purposes to blue gum, but it is more subject to gum veins, and has, therefore, to be carefully selected. It should be serviceable for street paving, but its tendency to warp and shrink renders careful seasoning and preparation necessary.

Among the other timbers of Tasmania which are available for export, blackwood (*Acacia melanoxylon*) and myrtle (*Fagus Cunninghamii*) are the best known and most in demand. Blackwood is extensively used for furniture, panelling for railway carriages, wainscoting, and interior fittings. It resembles cedar in appearance. Alcock and Son, of Melbourne, use it for billiard-tables, and Collard and Collard, of London, for pianos. It has lately been supplied to the Admiralty for gun carriages, having passed the necessary test in the Government arsenals. Myrtle has been favourably reported upon by Messrs. Ransome, sawmill and mechanical engineers, of Chelsea, for its strength and high finish. Fine examples of its use, with blackwood, for dados and wall linings may be seen in London.

In addition to these there are the Huon pine (*Dracrydium Franklinii*), an exceedingly fine timber, light and strong, which should constitute a useful and valuable commercial asset for local and export purposes.

NEW SOUTH WALES AND QUEENSLAND.

I do not propose to give any detailed description of the timbers of these States, since, as already indicated, sufficient particulars are not to hand to justify any confident expectations of a continuous supply for commercial purposes. The only timbers from New South Wales that are being exported to any extent are blackbutt (*Eucalyptus pilularis*), which is being used for sleepers and railway wagons, and tallow wood (*Eucalyptus microcorys*), which is being sent to South Africa for use as sleepers. Blackbutt is in colour

a lightish-yellow or brown. It grows to a height of from 50 to 150 feet, with a diameter of from 2 to 4 feet. Like other Australian hardwoods, it is liable to warp, and requires careful seasoning. There is a difficulty at present in securing large sizes for exportation, for which there is an increasing demand. Tallow wood is of a clear yellow or light reddish colour when newly cut, but changes afterwards to a pale-brown. Its average height is from 100 to 120 feet, and its diameter 6 to 8 feet. Its common name is due to the greasy nature of the wood. It is largely used in Sydney for street paving, and, with blackbutt and box (*Tristania conferta*), is being tried for that purpose in Westminster.

CONCLUSION.

My object in bringing forward at these meetings a practical subject of this nature is to aid, as far as one is able, the efforts that are being put forth by scientific, as well as commercial, men to promote the interests of our colonies, the development and progress of which cannot fail to be of deep concern to this association. It will, I am sure, be readily granted that the more widely the products and the possibilities of these great colonial possessions are known, the more clearly will the fact be accentuated that our interests, whether scientific, industrial, or commercial, are one.—*Transactions of the Royal Scottish Arboricultural Society*, Vol. XVII., Part 2.

Legal Questions.

We have received several letters from correspondents asking for advice on subjects relating to law. As we only undertake to answer questions concerning rural industries, we ask our correspondents to consult a solicitor on legal points, as such matters do not come within the scope of this *Journal*.

Agricultural Patents.

PATENTS ACCEPTED.

7539: Benjamin Parker, of Coimadai, Victoria, Australia, farmer. "Improved Apparatus for Destroying Rabbits, Foxes, and other like vermin." Dated 2nd November, 1903. (Drawings, 7s. 6d.; specification, 5s. 6d.)

7572: John Ogilvy McPherson, of Quarry Hills, near Fortrose, County of Southland, New Zealand, farmer. "An Improved Fencing Dropper." Dated 23rd November, 1903. (Drawings, 7s. 6d.; specification, 3s.)

7580: Monckton Davy Synnot, of 504 to 526 Bourke street, Melbourne, Victoria, wool broker. "An Improved Method of Trapping Rabbits." Dated 3rd December, 1903. (Drawings, nil; specification, 2s.)

7660: De Beauvoir de Lisle, sheep farmer, of Waimata Valley, Poverty Bay, Auckland, New Zealand, and Edwin Valentine Luttrell, veterinary surgeon, Gisborne, Auckland aforesaid. "An Improved Branding Composition." Dated 12th February, 1904. (Drawings, nil; specification, 2s.)

7670: Frederick Livingstone, of No. 36 Mark lane, London, England, merchant. "Method and Apparatus for Preparing a Food for Cattle and other Animals." Dated 29th February, 1904. (Drawings, 12s. 6d.; specification, 9s. 6d.)

7394: Frederick William Bursill, of Sedegmere, Awatere, Provincial District of Marlborough, New Zealand, sheep farmer. "Improvements in Fencing Standards." Filed 31st July, 1903. Dated 10th June, 1903, under Convention, section 80. (Drawings, 3s. 6d.; specification, 3s.)

Statistics.

RAINFALL IN THE AGRICULTURAL DISTRICTS.

TABLE SHOWING THE TOTAL RAINFALL FOR EACH MONTH OF THE YEAR IN THE AGRICULTURAL DISTRICTS OF QUEENSLAND.

STATIONS.	1903.										1904.			
	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.		Jan.	Feb.	Mar.	April.
<i>North.</i>														
Bowen ...	1.44	2.04	2.77	0.31	0.22	0.51	1.36	3.14	6.13	3.45	2.65	1.12	0.31	
Cairns ...	15.50	1.67	0.51	0.87	0.44	0.47	0.91	3.10	13.51	10.03	10.55	15.73	13.33	
Geraldton ...	14.03	7.48	3.42	2.07	7.08	3.79	3.05	7.13	37.86	21.37	14.04	31.09	33.73	
Herberton ...	12.04	0.64	1.00	0.19	0.33	Nil.	0.67	6.21	15.52	8.01	5.16	18.25	7.08	
Hughenden ...	0.81	1.73	Nil.	0.07	0.31	0.63	0.80	2.36	5.30	2.71	2.80	1.93	1.33	
Kamerunga ...	19.32	2.14	0.50	1.10	1.50	0.86	1.39	4.94	14.33	7.37	9.39	22.35	15.48	
Longreach ...	Nil.	3.51	Nil.	0.69	Nil.	1.58	0.90	0.83	1.76	1.77	2.69	1.01	0.31	
Lucinda ...	6.44	6.36	2.44	2.38	4.39	0.30	0.76	10.67	40.34	11.71	8.40	22.40	11.30	
Mackay ...	1.50	6.75	2.49	2.53	0.59	0.44	1.54	9.86	5.52	16.74	3.17	5.69	5.24	
Rockhampton ...	1.12	6.93	0.08	3.73	0.68	0.54	1.84	7.42	4.08	5.12	3.50	5.11	13.82	
Townsville ...	1.61	2.08	1.02	0.05	0.19	0.44	2.42	5.97	19.02*	5.48	5.19	4.01	1.03	
<i>South.</i>														
Barcaldine ...	Nil.	4.92	Nil.	0.90	0.50	4.23	1.01	4.00	0.92	3.26	0.96	0.11	1.19	
Beenleigh ...	1.90	12.40	0.92	5.04	2.26	4.13	3.29	4.78	1.60	2.81	1.25	8.06	14.99	
Biggenden ...	0.16	1.28	2.07	3.00	1.62	2.23	2.77	4.37	5.62	7.48	0.71	3.16	2.92	
Blackall ...	Nil.	5.19	Nil.	1.81	0.75	2.25	0.45	2.56	1.79	2.28	3.67	0.39	3.76	
Brisbane ...	1.33	11.92	0.73	5.56	3.84	4.73	3.65	3.98	2.19	2.65	0.77	7.07	7.23	
Bundaberg ...	0.38	11.55	0.33	5.98	0.88	3.55	0.43	3.25	0.97	3.18	0.85	4.26	5.64	
Caboolture ...	1.39	16.14	0.92	6.08	3.27	4.41	3.11	0.98	4.18	4.29	1.32	8.48	9.90	
Charleville ...	1.08	2.94	0.02	1.61	0.62	3.40	0.85	2.20	2.98	1.87	2.56	4.60	3.62	
Dalby ...	1.33	6.00	0.03	3.78	2.30	3.30	3.12	6.30	1.19	1.88	3.20	4.74	0.40	
Emerald ...	0.26	3.43	0.02	0.57	0.24	1.23	1.90	2.21	4.30	2.70	1.26	4.14	5.88	
Esk ...	1.25	9.27	0.30	2.97	4.21	4.86	3.69	4.02	1.43	2.37	1.86	3.18	4.91	
Gatton College ...	0.79	7.55	0.17	4.15	2.50	3.56	4.71	5.05	1.04	2.15	1.20	4.17	2.59	
Gayndah ...	0.09	6.03	0.05	2.81	1.06	2.62	4.37	3.03	5.12	7.01	1.83	2.97	1.63	
Gindie ...	0.19	3.31	Nil.	0.51	0.30	1.58	1.97	4.06	4.26	1.52	1.40	1.83	4.81	
Goondiwindi ...	1.73	5.07	0.15	4.38	2.09	4.22	2.16	3.73	3.62	2.90	2.65	7.32	0.37	
Gympie ...	1.28	10.20	0.62	1.67	2.72	2.42	5.61	4.50	4.58	0.27	1.80	3.32	10.86	
Ipswich ...	2.24	9.56	0.85	3.64	2.70	5.24	2.98	3.84	1.01	4.07	1.72	3.55	4.71	
Laidley ...	0.95	8.20	0.20	4.65	3.06	4.25	5.47	3.87	1.82	2.93	1.35	5.36	2.83	
Maryborough ...	0.66	9.58	1.60	6.17	1.09	1.93	2.62	3.96	5.04	2.64	0.56	3.94	10.07	
Nambour ...	0.83	19.46	1.29	5.38	3.95	3.60	3.85	6.13	2.43	6.39	1.91	10.30	15.43	
Nerang ...	3.04	15.75	2.36	7.34	2.21	3.81	3.52	3.86	4.24	3.50	0.85	11.18	13.83	
Roma ...	0.39	3.17	0.34	2.26	1.13	6.61	1.92	3.16	4.21	1.85	0.59	2.32	5.06	
Stanthorpe ...	1.18	6.87	0.74	4.71	1.98	6.07	3.45	4.45	2.59	2.29	1.33	6.57	0.71	
Tambo ...	0.02	1.96	0.01	2.64	0.27	4.33	1.08	3.17	2.91	2.48	1.72	1.26	5.46	
Taroom ...	0.82	8.83	0.23	3.83	2.21	1.51	2.05	3.76	3.22	1.39	2.79	1.58	2.21	
Tewantin ...	1.80	20.22	7.42	7.09	5.70	5.80	2.85	9.85	1.37	3.03	2.59	15.55	27.46	
Texas ...	1.84	4.34	0.36	4.53	3.21	4.55	2.47	4.43	4.44	1.70	3.67	5.72	0.03	
Toowoomba ...	1.27	7.94	0.34	3.00	3.00	4.06	3.82	4.85	4.27	4.26	3.98	4.76	3.29	
Warwick ...	0.73	8.62	0.10	5.45	2.63	3.41	2.89	3.92	2.73	0.60	2.91	5.74	0.66	
Westbrook ...	0.34	4.23	2.53	3.89	1.63	3.89	4.03	5.11	3.75	1.46	2.82	3.49	9.00	

* One day gauge overflowed.

EDGAR L. FOWLES,

For the Hydraulic Engineer.

PRICES IN BRITISH MARKETS OF ARTICLES WHICH CAN BE PRODUCED IN QUEENSLAND.

BUTTER.—Australian, 90s. to 92s.; Danish, 95s.; New Zealand, 84s. to 86s.; Tasmania, 90s. The butter exported from Queensland during the four months ending 30th April, 1904, amounted to 2,932,717 lb., valued at £105,760.

CHEESE.—Canadian, 50s. to 51s.; New Zealand, 48s. to 49s.

CONDENSED MILK.—No alteration since last quotation.

SUGAR (duties, raw, 2s. to 3s. 10d. per cwt.; refined, 4s. 2d. and $\frac{1}{2}$ per cent.).—Refined, £16 to £18 15s.; raw, £14 to £16 10s. per ton; German beet, 88 per cent., 9s. 2d. per cwt.

MOLASSES (duty, 2s. per cwt. and $\frac{1}{2}$ per cent.).—4s. 6d. to 8s. per cwt.

RICE.—Rangoon, £7 to £12; Japan, £12 to £16; Java, £18 to £21; Patna, £15 to £17 per ton.

COFFEE (in bond, duty $1\frac{1}{2}$ d. per lb. and $\frac{1}{4}$ per cent.).—Ceylon plantation, 41s. to 100s. to 130s.; peaberry, 70s. to 126s.; Santos, 31s. to 48s.; Mocha, 54s. to 90s.; Jamaica, 95s. to 125s. per cwt.

CHICORY Root, dried (duty paid).—26s. to 27s. per cwt.

ARROWROOT.—St. Vincent, $1\frac{3}{4}$ d. to $3\frac{1}{2}$ d.; Natal, $5\frac{3}{4}$ d. to 7d.; Bermuda, 1s. 2d. to 1s. 5d. per lb.

WHEAT.—Duluth, 36s. to 37s. 9d. per 496 lb.; English, 28s. to 34s. per 504 lb.; Australian, 29s. $10\frac{1}{2}$ d. to 30s. $9\frac{1}{2}$ d. per 480 lb. = 3s. $8\frac{3}{4}$ d. to 3s. $10\frac{3}{4}$ d. per bushel.

FLOUR.—25s. 9d. to 33s. per 280 lb.

MALTING BARLEY.—24s. to 27s. to 32s. per 448 lb.; grinding, 20s. to 24s. per 416 lb.

OATS.—New Zealand, 18s. 6d. to 24s. per 384 lb.

SPLIT PEAS.—39s. to 40s. per 504 lb.

GINGER.—Jamaica, 32s. to 52s.; Cochin, 37s. to 70s.; Japan, 24s. to 25s. per cwt.

VANILLA.—3s. to 7s. per lb.

PEPPER.—Capsicums, 14s. to 65s.; chillies, 45s. to 50s. per cwt.; black, $5\frac{7}{8}$ d. to $6\frac{5}{8}$ d.; white, $9\frac{3}{8}$ d. to $9\frac{1}{2}$ d. per lb.

GREEN FRUIT.—Apples: American 16s. to 22s.; Australian, 7s. to 18s.; Tasmanian, 7s. 9d. to 12s. 6d.; South Australian Cleopatras, 10s. 9d. to 13s. 6d. per case; bananas, 10s. to 15s. per bunch; pineapples, 2s. 9d. to 6s. each; oranges, Valencia, per 420, common, 9s. 6d. to 10s.; medium, 11s. to 12s.; fine selected, 14s. to 20s.; finest selected, 24s. to 30s.; lemons, Messina, per 360, finest selected, 14s. to 17s.; ordinary to fine, 10s. to 12s.

FRUIT PULP.—Australian. 18,000 cases were sold in London in April at the following prices:—Gooseberry, 5s. 6d. to 6s. 6d.; apricot, 9s. to 15s.; raspberry, 19s. to 24s.; greengage, 8s.; plum, 6s. to 7s. 6d.; peach, 6s.; New Zealand, black currant, 38s. to 45s. per cwt.

DATES.—Taflat, no quotation; Egyptian, 11s. to 15s. per cwt.; Persian, 6s. to 9s. per case.

COTTON.—Uplands, 8d.; Sea Island, 1s. 2d. to 1s. 8d. per lb.

COTTON SEED.—£6 to £6 2s. 6d. per ton.

COTTON-SEED OIL.—Crude, £18; refined, £19 10s. to £21 5s. per ton.

COTTON-SEED OIL CAKE.—£4 12s. 6d. (undecorticated) to £6 15s. (decorticated) per ton.

LINSEED.—50s. to 52s. per 416 lb.

LINSEED OIL.—£17 5s. to £17 15s. per ton.

LINSEED OIL CAKE.—£6 15s. to £7 2s. 6d. per ton.

OLIVE OIL.—£20 to £60 per tun (252 gallons).

COPRA (cocoanut-kernel).—£16 to £16 10s. per ton; £8 to £9 per ton at the S. S. Island trading stations. Corresponding value in Queensland, £10 to £12 per ton.

COCOANUT OIL.—£28 to £30 per ton.

BEESWAX.—Australian, £4 15s. to £7 15s. per cwt.

LUCERNE SEED.—60s. to 70s. per cwt.

CANARY SEED.—77s. to 80s. per quarter of 480 lb. = 9s. $7\frac{1}{2}$ d. to 10s. per bushel.

MANILLA HEMP.—£30 to £35 per ton.

SISAL HEMP.—£35 per ton. £32 to £35 in Melbourne market.

NEW ZEALAND HEMP.—£29 to £31 per ton.

FLAX.—£48 to £52 per ton.

TAPIOCA (duty, 5d. per cwt.).— $2\frac{3}{4}$ d. to 5d. per lb.

FROZEN MEAT.—The following are the Frozen Meat Trade Association's Smithfield market quotations for the undermentioned classes of frozen meat, based on actual sales of not less than 100 carcasses of mutton or lamb of fair average quality. These quotations are not for selected lines, but for parcels fairly representative of the bulk of the shipments now on the market:—

New Zealand Sheep.

(Crossbred Wethers and Maiden Ewes.)

	May 14.	May 21.
Canterbury, light (48 lb. to 56 lb.)	4 $\frac{3}{4}$ d.	4 $\frac{1}{16}$ d.
Canterbury, medium (56 lb. to 64 lb.)	4 $\frac{5}{8}$ d.	4 $\frac{3}{8}$ d.
Canterbury, heavy (64 lb. to 72 lb.)	4 $\frac{1}{2}$ d.	4 $\frac{3}{8}$ d.
Dunedin and Southland (56 lb. to 64 lb.)	4 $\frac{1}{4}$ d.	4 $\frac{3}{16}$ d.
North Island (56 lb. to 65 lb.), ordinary	4 $\frac{1}{16}$ d.	4d.
North Island, best	4 $\frac{3}{16}$ d.	4 $\frac{1}{8}$ d.

Australian Sheep.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	... ..	None offering.
Light (under 50 lb.)	... ..	None offering.

River Plate Sheep.

(Crossbred and Merino Wethers.)

Heavy (over 50 lb.)	... ..	3 $\frac{7}{8}$ d.
Light (under 50 lb.)	... ..	3 $\frac{3}{8}$ d.

New Zealand Lambs.

Canterbury, light (28 lb. to 36 lb.), new season's	... ..	5 $\frac{5}{16}$ d.	5 $\frac{5}{16}$ d.
Canterbury, heavy (36 lb. to 42 lb.), new season's	... ..	5 $\frac{5}{16}$ d.	5 $\frac{1}{4}$ d.
Dunedin and Southland (28 lb. to 42 lb.)	... ..	5 $\frac{1}{8}$ d.	5 $\frac{1}{8}$ d.
North Island (28 lb. to 42 lb.)	... ..	5 $\frac{1}{16}$ d.	5 $\frac{1}{16}$ d.

Australian Lambs.

30 lb. to 40 lb.	4 $\frac{3}{4}$ d.	4 $\frac{3}{4}$ d.
------------------	--------	--------------------	--------------------

River Plate Lambs.

30 lb. to 40 lb.	4 $\frac{3}{4}$ d.	4 $\frac{3}{4}$ d.
------------------	--------	--------------------	--------------------

New Zealand Frozen Beef.

Ox, fores (180 lb. to 220 lb.)	... ..	2 $\frac{1}{2}$ d.	2 $\frac{7}{16}$ d.
Ox, hinds (180 lb. to 220 lb.)	... ..	3 $\frac{5}{16}$ d.	3 $\frac{3}{8}$ d.

Australian Frozen Beef.

Ox, fores (160 lb. to 200 lb.)	... ..	2 $\frac{3}{8}$ d.	2 $\frac{1}{4}$ d.
Ox, hinds (160 lb. to 220 lb.)	... ..	2 $\frac{1}{4}$ d.	3 $\frac{1}{8}$ d.

River Plate Frozen Beef.

Ox, fores (160 lb. to 220 lb.)	... ..	2 $\frac{7}{16}$ d.	2 $\frac{3}{8}$ d.
Ox, hinds (160 lb. to 220 lb.)	... ..	2d.	3 $\frac{1}{4}$ d.

(All quotations for beef are nominal.)

EGGS.—French, 6s. to 9s. 6d.; Danish, 6s. 9d. to 9s. per 120.

BACON.—Irish, 46s. to 58s.; American, 38s. to 46s.; Canadian, 42s. to 45s. per cwt.

HAMS.—Irish, 70s. to 80s.; American, 46s. to 50s. per cwt.

TALLOW.—Mutton, fine, 27s. 6d.; medium, 25s. 6d.; beef, fine, 27s. 6d.; medium, 23s. 9d. per cwt.

GOATSKINS.—Cape, from extra light to heavy, 9d. to 15 $\frac{1}{2}$ d.; Angora, light to heavy, 5d. to 7 $\frac{1}{2}$ d.; Natal, goat and Angora, 1 $\frac{3}{4}$ d. to 8d. per lb.

POULTRY (Smithfield).—Yorkshire, 3s. 3d. to 3s. 6d.; Essex, 2s. 9d. to 3s. 3d.; Boston, 2s. 6d. to 3s.; Surrey, 3s. to 5s.; Sussex, 3s. 6d. to 4s.; Welsh, 2s. 6d. to 3s.; Irish, 2s. 3d. to 2s. 9d. per pair; Turkey cocks, 8s. to 12s.; hens, 5s. to 6s.; goslings, 5s. 6d. to 7s.; country ducks, 3s. 6d. to 6s. per pair; rabbits, 9d. to 10d.

General Notes.

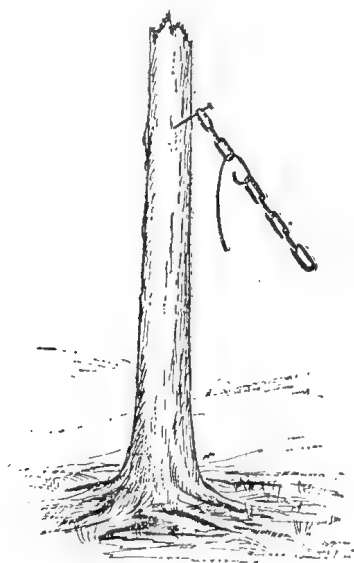
A TIMBER SLIDE.

Mr. S. D. McBride, Hull River, near Cardwell, sends us the following sketch and description of a useful and effective slide for hauling log timber out of the bush, which entails less labour on bullocks or horses than when ordinary "snigging" is resorted to:—



It is made from the fork of a tree, each limb, CC, being from 5 to 6 inches in diameter; a cross-piece, B, of 4 x 3 hardwood, or of round timber, is let in, and bolted to CC. The cross-piece A is of $\frac{3}{4}$ -inch round iron, driven through auger holes in each limb about 6 or 8 inches from the "nose" of the slide. The latter is now complete. In loading, hook a chain to B; then place the end of the log on B. Pass the chain *over* the log, then under it, then again over it; thence pass it under B, and also under A, and upwards through the space between A and the end of the fork. Hook it on to the swingle-bars attached to the horses. With this slide, it does not matter if there are stumps in the way, so long as there is room enough for the wider part of the slide to pass. Should it happen to hit a stump, the slide will glance to either side.

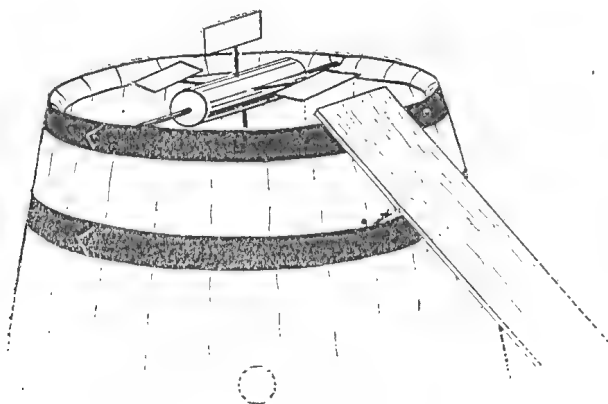
The second sketch shows a method of putting a home-made split link of fencing wire into a broken chain. Hang one part of the chain to a stout nail.



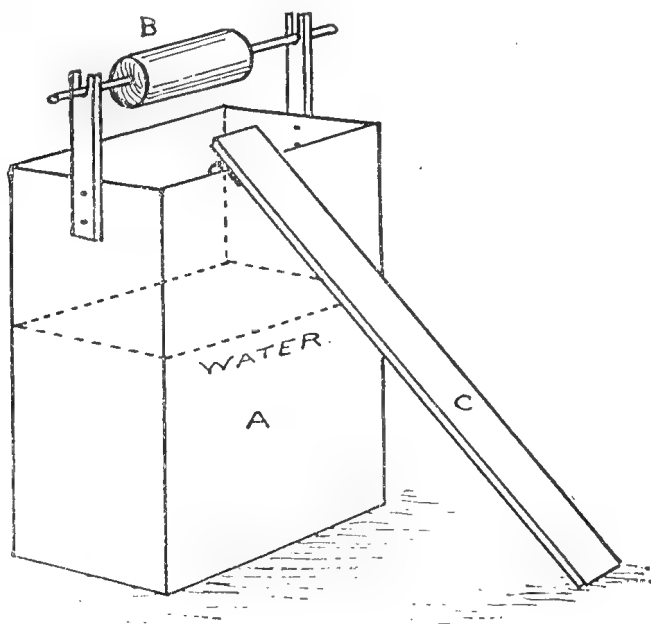
Then bend the end of a piece of wire as shown. Place both pieces of chain in the link so formed, and then reverse the wire until the required thickness is gained.

EFFECTIVE MOUSE-TRAPS.

Some time ago a friend described a mouse-trap which he had found very effective. Finding that rats and mice had become too wary for the ordinary traps, he fastened a wooden cylinder to an axle, which was made to revolve in two grooves on the edge of a tub. To the cylinder were fastened four flanges, which approached the end of a board which was intended to enable the rodents to reach the top of the tub. On the cylinder baits of cheese and



bacon were fastened. When the mice or rats reached the end of the board, they jumped to the cylinder, which at once revolved and dropped them into the water in the tub, whence there was no escape. The *Australian Field* depicts a similar contrivance, without the flanges, as shown below:—



It is easily made, and the material costs almost nothing. The body of the trap (A) is a kerosene-tin having two arms attached, which extend a few inches above the top of the tin. Across these arms, and resting in a deep curve on the top, is a rod of small iron or large fencing wire, and on this is soldered round tin canister (B). A small piece of light pine board (C) leads from the floor

to the top of the kerosene-tin, where it is hung by wire hooks. The canister is smeared with grease or dripping, the kerosene-tin is half-filled with water, and the trap is ready. Attracted by the smell of the dripping or grease on the canister, the mouse runs up the board, makes a jump across the few inches of space between the end of the board and the canister, the latter revolves directly the mouse comes on it, and he falls into the water. The best of this trap is that it requires no setting, and the mice can come on as fast as possible—it will always accommodate them.

A Wallumbilla correspondent says that where mice are numerous an effective trap may be made by sinking a kerosene tin level with the ground near a barn or wherever there is wheat or other grain. Water is poured in to a depth of 3 inches. In one night our correspondent caught 200, and never less than 100 in seven tins. This is worth a trial by farmers who are now so pestered with this plague of mice.

EGG-LAYING COMPETITION.

In connection with the forthcoming egg-laying competition at the Queensland Agricultural College, Messrs. J. Jackson and Co. (Limited) have offered a special prize of one guinea for the pen of birds whose eggs carry the highest value in the market.

FIXING OF AMMONIA FROM URINE.

For the fixing of ammonia from the urine of animals in stables, a litter of sawdust moistened with a solution of sulphate of iron (green vitriol) may be used with advantage. If no sulphate of iron is to hand, a weak solution of sulphuric acid (oil of vitriol) may be used for sprinkling the sawdust. Dry sawdust by itself has very little absorbing power.

AGRICULTURAL AND HORTICULTURAL SHOWS.

The Editor will be glad if the secretaries of Agricultural and other Societies will, as early as possible after the fixture of their respective shows, notify him of the date, and also of any change in date which may have been decided on.

Answers to Correspondents.

ROLLED BEEF.

ENQUIRER, Crow's Nest.—

1. Keep two or three ribs of beef until quite tender. Take out the bones. Rub in spices or salt without the spices (allspice is generally used). Then begin to roll the meat. Slip four or five pieces of string round it at short intervals. As rolling goes on, skewer the meat and haul the slip strings tight. Proceed till the whole is rolled, then tighten up the strings and remove the last skewers.

2. Rub in salt vigorously, then stack the meat on a sloping board to allow the blood, &c., to drain away. Hang up on lines. Next day salt again, restack, and hang up. Continue this for three or four days, and the meat will keep perfectly.

PAPAIN, ARROWROOT, BEESWAX, EUCALYPTUS OIL.

W. EUSTANCE, Mooloolah.—

1. Papain, or the juice of the papaw fruit, is obtained by slightly scoring the rind of the fruit with a knife. The collection of the juice is a regular industry in the Island of Montserrat, West Indies. The peasants collect the juice in calabashes, in which a small quantity of water has been previously placed. As the juice falls into the water, it thickens to the consistency of ice cream, and is sold in this state to the manufacturers at the rate of $\frac{3}{4}$ d. to 1d. per oz. The round variety of fruit gives the greatest quantity of juice. A lad can gather, on an average, 4 oz. of juice per hour. The price of dried papain varies from 12s. to 16s. per lb. It has, however, sold as low as 5s. per lb. The best method of preparing the dry article is to press the juice out of the fruit, clarify it by filtration through a twill bag, and precipitate the ferment with alcohol. This is then dried. Sometimes it is further purified by treatment with water.

Papain is used as a medicine. It possesses great anthelmintic (or worm-expelling) properties. It is a remedy for bleeding piles and ulcers, is useful in dyspepsia, cures psoriasis or ringworm. A case is quoted where a sufferer from a violent attack of gallstones was cured in three days by taking half a teaspoonful of the milk of the green papaw twice daily. A French physician, in 1895, cured an obstinate case of tapeworm by doses of 10 grains of papain given three times daily.

2. Under the provisions of the British Food and Drug Act, Queensland arrowroot, which is exclusively made from the *Canna edulis*, is not considered to be genuine arrowroot, and can only be sold in Great Britain if branded "Queensland Arrowroot." The Hon. A. J. Thynne, when Minister for Agriculture, advised Queensland growers to add the words "Prepared from *Canna edulis*." When arrowroot is quoted in British price lists it should be understood that in every case the standard arrowroots of St. Vincent, Natal, and Bermuda are referred to. These are manufactured from the *Maranta arundinacea*, and are perfectly distinct in physical character and properties from the *Canna edulis* starch. They are readily identified under the microscope (see *Queensland Agricultural Journal*, Vol VI., p. 502). The Queensland arrowroot is not quoted in the British price lists, but it averages £15 per ton.

3. To refine beeswax: Melt the wax in a jar, and put into it powdered nitrate of soda (Chili saltpetre) in the proportion of 1 oz. to 1 lb. of wax. Afterwards add, by degrees, 2 oz. to 1 lb. of sulphuric acid, diluted with ten times its weight of water, keeping the wax warm and stirring the while. Let it stand a short time, and then fill up the jar with hot water and allow the whole to cool. The wax should then be white. Afterwards wash with water to remove any nitric acid which may remain, as it would make the wax yellow. There is a slight difference observable in the quality during refining or bleaching.

4. The *Eucalyptus globulus* does not thrive well in Queensland. The oil is distilled from *E. globulus*, *E. amygdalina*, *E. dumosa*, *E. oleosa*, and others. Most of the Eucalyptus oils are distilled from leaves indiscriminately mixed.

DESTROYING LANTANA.

A. H. WILKIN, Tewantin.—

Arsenite of soda will kill lantana. (4 lb. of white arsenic and 3 lb. of washing soda in 1 gallon of water, boiled and stirred for half an hour, 5 oz. to 8 oz. to be used per gallon of water.)

The price of arsenic wholesale is from 3d. to 4d. per lb.

WILLOW WEIRS.

A. ADDIRSON, Lindeman Island.—

Mr. Benson suggests the Babylonian willow as one which would probably thrive in the Bowen district. Stumps, which will rapidly take root, may be obtained from the Brisbane or Toowoomba Botanical Gardens.

PRICKLY-PEAR POISON.

S. D. McBRIDE, Hull River.—

Thanks for your description of a timber-slide, which appears in another place. You will find the ingredients and quantities for making prickly-pear poison under the head of "Destroying Lantana," in this issue.

We gave no illustration of a "slide" in the May number of the *Journal*, but in April we illustrated and described the German foresters' method of moving a log from one tramline to another running at right angles to it. (*Journal*, April, 1904, p. 243.)

ORANGE-TREE SCALE INSECT.

IGNORAMUS, Milton.—The ladybird you send has been submitted to Mr. H. Tryon, Government Entomologist. He says it was formerly named by the French entomologist Dejean *Orcus australasie*. Writing in 1889 of ladybirds that destroy more than one kind of orange-tree-frequenting scale insects, Mr. Tryon gave an account of this serviceable beetle. His experience, however, does not suggest that, save in exceptional cases, it is much to be depended on for ridding trees of pests of the kind referred to. His report in 1889 of its habits was received in California at the time with much interest, and led in part to a second visit on the part of the United States authority, Dr. Koebele, for the purpose of securing it and other coccinids. The *Orcus australasie* is a native ladybird.

CYPHERS INCUBATORS.—EGGS BY RAIL, &c.

A.B.S., Stonehenge, Longreach.—

1. We do not recommend or denounce any incubator or implement of any kind unless we have indisputable evidence of its value or uselessness. The information should be obtained from those who use them. We may state, however, that the Cyphers incubator is used at the Queensland Agricultural College, and Mr. Hindes, the Poultry Expert there, says it is the best he has ever used.

2. If carefully packed, as they would be from the College, and not knocked about on the journey, eggs should travel safely to Longreach, and be fit for the incubator. But there is always a risk, and a very considerable one, in sending so long a distance by rail. The College has had many failures recorded in such cases. No eggs can be supplied before June.

3. The most profitable fruit trees for your district would be citrus trees on deep, sandy loam; also grape vines where means for irrigation with suitable water exists.

4. Write to Mr. H. R. Stephens, Toowoomba, who will give you full information concerning starting an apiary.

Two useful books on bees are: A. J. Roots, "The ABC of Bee Culture"; H. L. Jones, Melbourne Apiary, Goodna, "ABC of Bee Culture." Agent in Brisbane, B. G. Wilson.

The Markets.

PRICES FOR FRUIT—ROMA-STREET MARKETS.

Article.	MAY.	
	Prices.	
Apples, Eating, per packer	3s. 6d. to 7s. 6d.	
Apples, Cooking, per case	6s.	
Apples, Tasmanian, Cooking, per case ... ..	...
Apples, American, Eating ... ..	...
Apples, American, Green ... ..	...
Lemons, Italian, per 360 ... ..	...
Lemons, Italian, per 180	6s. 6d.	
Lemons, American, per 180 ... ..	...
Lemons, New South Wales, per case	3s.	
Oranges, Italian, per 180 ... ..	...
Oranges, Local, per case	3s.	
Oranges, Sydney (packers) ... ..	...
Mandarins, Local, per case	6s.	
Mandarins, Bowen ... ..	...
Apricots, New South Wales, boxes (half-gincase) ... ..	...
Apricots, Queensland, half-case ... ..	...
Plums, half-gincase	2s.	
Plums, Sydney, half-gincase ... ..	...
Peaches, half-gincase ... ..	...
Nectarines, half-gincase ... ..	...
Gooseberries, English ... ..	...
Cherries ... ..	...
Passion Fruit, quarter-case	2s. 6d.	
Mangoes, per case ... ..	...
Pineapples, rough, per dozen	2s. 6d.	
Pineapples, Queen ,,	5s.	
Melons ... ..	...
Rockmelons	10d.	
Bananas, per bunch	2d.	
Bananas, per dozen	2s.	
Tomatoes, quarter-case ... ..	...
Papaw Apples, quarter-case	3s. 6d.	
Custard Apples, quarter-case ... ..	...
Granadillas, case	3s.	
Seville Oranges, apple-case	5d.	
Cape Gooseberries, quart ... ..	...
Pears (Melbourne), export case	4s. 6d.	
Pears (Tasmanian), quarter-case	1s. 3d.	
Rosellas, per sugar-bag ... ..	...

PRICES OF FARM PRODUCE IN THE BRISBANE MARKETS FOR MAY.

Article.	MAY.	
	Prices.	
Bacon	lb.	6½d. to 8d.
Barley, Malting	bush.	2s. 9d. to 2s. 11d.
Bran	ton	£2 10s. to £2 15s.
Butter, Factory	lb.	6d. to 8½d.
Chaff, Mixed	ton.	£2 5s. to £2 12s. 6d.

CUSTOMS UNION OF SOUTH AFRICA.
IMPORT DUTIES ON PRODUCE THAT CAN BE EXPORTED FROM
QUEENSLAND.

Article.	Rate.	Per
Agricultural Implements	free	...
Arrowroot	£10	£100
Bacon and Hams	1d.	lb.
Barley and Maize	1s.	100 lb.
Bark	£10	£100
Beef	1d.	lb.
Binding Twine	free	...
Bone Dust	free	...
Bran	£10	£100
Butter	2d.	lb.
Canary Seed	£10	£100
Cattle for Slaughter	£1 10s.	each
Cheese	£10	£100
Chicory Root (dried)	2d.	lb.
Coffee (raw)	3d.	lb.
Coffee (roasted or ground)	2d.	lb.
Condensed Milk	3d.	lb.
Compressed Fodder	1s.	100 lb.
Cotton (raw)	free	...
Cured Fish	1d.	lb.
Desiccated Milk	3d.	lb.
Eggs	£10	£100
Fertilisers	free	...
Fibres	free	...
Flax	free	...
Flour	2s.	£100
Fruit Preserved in Spirits—		
Duty on the Spirits	15s.	Imperial gallon
And in addition	£10	£100
Duty on the Fruit... ..	2d.	lb.
Fruit (green)	free	...
Fruit (pulp)	2d.	lb.
Fruit Wines, 3 per cent.	£10	£100
Ginger (green)	£10	£100
Ginger (dry or ground)	2d.	lb.
Hemp (raw)	free	...
Jams, Jellies, &c.	2d.	lb.
Jute	free	...
Lucerne Hay	1s.	100 lb.
Malt	1s.	100 lb.
Milk (condensed)	3d.	lb.
Mules	free	...
Meats	1d.	lb.
Maize	1s.	100 lb.
Oaten Hay	1s.	100 lb.
Oil Cake	1s.	100 lb.
Onions	3d.	lb.
Paddy	2d.	lb.
Pickles	2d.	lb.
Pollard	2s.	100 lb.
Potatoes	£10	£100
Railway Sleepers	£2 10s.	£100
Rice	£10	£100
Seeds for Sowing	free	...
Sheep	5s.	each
Smoked Fish	1d.	lb.
Spices	2d.	lb.
Sparkling Wines—		
Not exceeding 20 per cent. proof spirit	12s. 6d.	Imperial gallon
And in addition	£10	£100
Still Wines—		
Not exceeding 20 per cent. proof spirit	4s.	Imperial gallon
Exceeding 20 per cent., but under 50 per cent. proof spirit	8s.	Imperial gallon
Sugar (unrefined)	3s. 6d.	100 lb.
Sugar (refined)	5s.	100 lb.
Tannin Extracts	free	...
Tobacco Leaf (stemmed)	2s. 6d.	lb.
Tobacco Leaf (unstemmed)	2s.	lb.
Treacle	3s. 6d.	100 lb.
Vegetables (pickled, pressed, or preserved)	£10	£100
Wheat	1s.	100 lb.
Wheaten Hay	1s.	100 lb.

Farm and Garden Notes for July.

FIELD.—With a fairly good season, the field operations generally for the month will consist of preparing the land for cotton, potatoes, maize, oats, barley, vetches, rye, tobacco, sisal hemp, sugar-cane, field carrots, mangolds, &c. Prairie and other grasses, if not already sown in March and April, may yet be sown. In suitable localities, early potatoes may be planted, but the young shoots will run the risk of being nipped by frost. There is no better time for sowing lucerne. The soil should be a deep, calcareous loam, where the roots can penetrate deep down into the subsoil in search of moisture and plant food. If the subsoil is at all tough, it should be loosened to at least a depth of 18 inches by the help of the subsoil plough; but on no account should the subsoil be brought to the surface. The land must be brought to the finest possible tilth, to give the seed every chance of germinating. After sowing, run a light harrow over the land to cover the seed. From 10 lb. to 12 lb. of seed is sufficient for an acre. During suitable weather, rice may be sown in the North and on the Southern Coast. The coffee crop should now be harvested. Yams and turmeric should be unearthed.

KITCHEN GARDEN.—Full sowings may be made of cabbage, carrot, broad beans, lettuce, parsnips, beans, peas, radishes, leeks, spring onions, beetroot, eschalots, mustard and cress, &c. As westerly winds may be expected, plenty of hoeing and watering will be required to ensure good crops. Pinch the tops of broad beans which are in flower, and stake up peas which require support. Plant out rhubarb, asparagus, and artichokes. In warm districts it will be quite safe to sow cucumbers, marrows, and squashes during the last week of the month. In colder localities it is better to wait till the middle or end of August. Get the ground ready for sowing French beans and other spring crops. Plough up or dig all vacant land, and let it lie in the rough until required. If harrowed and pulverised before that time, the growth of weeds will be encouraged, and the soil is deprived of the sweetening influence of the sun, rain, and air.

FLOWER GARDEN.—The roses will now want looking after. They should have already been pruned, and now any shoots which have a tendency to grow in wrong directions and to crowd the centre of the bush should be rubbed off. Overhaul the ferneries, and top dress with a mixture of sandy loam and leaf mould, staking up some plants and thinning out others. Treat all classes of plants in the same manner as the roses where undesirable shoots appear. All such work as trimming lawns, digging beds, pruning, and planting should now be got well in hand. Plant out antirrhinums, pansies, hollyhocks, verbenas, petunias, &c., which were lately sown. Sow zinnias, amaranthus, balsam, chrysanthemum, tricolor, marigolds, cosmos, coxcombs, phloxes, sweet peas, lupins, &c. Plant gladiolus, tuberose, amaryllis, pancratium, ismene, crinums, belladonna, lily, and other bulbs. Put away dahlia roots in some warm, moist spot, where they will start gently and be ready for planting out in August and September.

Orchard Notes for June.

By ALBERT H. BENSON.

The marketing of citrus fruits is still one of the principal operations in many orchards throughout the State, and the remarks on this matter that have appeared in these notes for the past two months should be borne in mind and acted upon, as, no matter what the quality of the fruit may be, it always sells best when well packed and attractively got up, as the better it looks the better it sells.

I cannot lay too great stress on the extreme importance of handling the fruit carefully and of sweating it prior to shipment. The common practice of pulling the fruit from the tree and packing and shipping it straight away is responsible for a very large proportion of the loss so commonly met with in marketing the fruit early in the season. The skin in the earlier stages of ripening is rigid and full of moisture, so that it is easily bruised, the cells of the skin being ruptured. Fungus growths of various kinds attack the injured skin, with the result that the fruit soon becomes completely rotten, and is covered with a mass of greenish or bluish mould. This loss can be reduced to a minimum by cutting the fruit instead of pulling it, and by handling it like eggs instead of like road metal. In addition to the ordinary loss on the fruit by bad handling, a further loss takes place when it is found necessary to cyanide the fruit, as, for example, when it has to be shipped to the Southern States, as the gas at once finds out every bruise, case mark, or injury to the skin, such as plugging—viz., pulling the stem out—and turns the same black, thereby greatly detracting from the value of the fruit.

In many parts of the State deciduous fruit trees should be pruned during the month, and I strongly advise fruit-growers to read my remarks on this subject which appeared in a previous issue of this *Journal*, as thorough pruning is seldom carried out, many trees being allowed to grow of their own sweet will without let or hindrance. This neglect to properly prune fruit trees is conducive to the rapid spread of many insect and fungus diseases, as when trees are allowed to grow into a dense bush it is impossible to keep them clean by means of any of the ordinary methods adopted for the eradication of disease, such as spraying, &c.; and when they are allowed to straggle all over the place the straggling limbs are very apt to become more or less diseased.

Old neglected trees of good varieties, and of which the roots are still healthy, should be cut hard back, and all dead, broken, or badly diseased branches should be cut off and a new head be allowed to form; but where such trees only produce inferior fruit that is of no commercial value, they should be either destroyed or, if wished, they may be grafted on next spring with good valuable varieties. Old neglected trees are the breeding-grounds of many diseases, and when they are of no value whatever they should be destroyed, as they are a menace and source of infection to the neighbourhood in which they are growing.

Do not be afraid to prune too heavily, as it is better to lose a crop and thereby get your tree or trees into a healthy state than to leave them in an unhealthy and unpruned condition and get a poor crop of inferior fruit. Prune hard, and gather up and burn all prunings; do not let them lie about, but burn them up, as by doing so any disease that may be on the wood that has been pruned off will be destroyed. When trees are hard cut back and only the main limbs are left, it is advisable to follow up the same pruning with a dressing that will destroy all insects or fungus pests still remaining on the tree, and for this purpose the best remedy is to paint the stems and branches with the following mixture, prepared thus:—Boil 2 lb. of sulphur and 1 lb. of quicklime in 2 gallons of water for about one hour, then add fine clay to the mixture till it is as thick as paint, and apply with a brush. Fine flour can be used in the place of the clay if desired, and will render the mixture more lasting.

Where San José, Greedy Mussel, or Parlataria Scales are present, this method of treatment is the most efficacious, and is even better than spraying with the sulphur, lime, and salt wash mentioned in my pamphlet on spraying. This mixture is also of value for painting the stems and main branches of citrus-trees covered with mosses or lichens, or attacked by White, Red, Circular, Black Mussel, or other scale insects.

Where the ground is ready, plant deciduous trees this month; do not plant too deep, and cut back hard at planting. Clean up the orchard thoroughly, and plough and leave the ground rough as soon as the trees are pruned and the prunings are burnt. Gather up and destroy all fly-infested fruit of all kinds, as the more thoroughly the fly is kept down during the winter on the coast, the fewer flies there will be to deal with in spring. Where not already done, see that pineapples are protected from frost, and keep the ground between the plants well worked in order to retain moisture, as the winter months are usually dry and the plants are liable to injury through drought. The same remarks apply to bananas, and the unripe bunches of fruit should be protected from slight frosts or cold spells by any suitable available material.

Times of Sunrise and Sunset, 1904.

DATE.	MAY.		JUNE.		JULY.		AUGUST.		PHASES OF THE MOON.
	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	Rises.	Sets.	
1	6:14	5:16	6:31	5:0	6:40	5:3	6:30	5:18	7 May ☾ Last Quarter 9 50 p.m.
2	6:14	5:15	6:31	5:0	6:40	5:4	6:30	5:18	15 " ☉ New Moon 8 58 "
3	6:15	5:14	6:32	5:0	6:40	5:4	6:29	5:19	22 " ☽ First Quarter 8 18 "
4	6:15	5:13	6:32	5:0	6:40	5:4	6:29	5:20	29 " ○ Full Moon 6 54 "
5	6:16	5:13	6:33	5:0	6:40	5:4	6:28	5:20	
6	6:17	5:12	6:33	5:0	6:40	5:5	6:28	5:20	
7	6:17	5:12	6:34	5:0	6:40	5:5	6:27	5:21	6 June ☾ Last Quarter 3 52 p.m.
8	6:18	5:11	6:34	4:59	6:40	5:6	6:26	5:21	14 " ☉ New Moon 7 10 a.m.
9	6:18	5:10	6:35	4:59	6:39	5:6	6:25	5:22	21 " ☽ First Quarter 1 10 "
10	6:19	5:10	6:35	4:59	6:39	5:7	6:24	5:23	28 " ○ Full Moon 6 23 "
11	6:19	5:9	6:35	4:59	6:39	5:7	6:23	5:23	
12	6:20	5:9	6:35	4:59	6:39	5:7	6:22	5:24	6 July ☾ Last Quarter 8 54 a.m.
13	6:20	5:8	6:36	4:59	6:39	5:8	6:21	5:25	13 " ☉ New Moon 3 27 p.m.
14	6:21	5:8	6:36	4:59	6:39	5:8	6:20	5:25	20 " ☽ First Quarter 6 48 a.m.
15	6:21	5:7	6:36	4:59	6:39	5:9	6:19	5:26	27 " ○ Full Moon 7 41 p.m.
16	6:22	5:7	6:37	4:59	6:38	5:9	6:18	5:26	
17	6:22	5:6	6:37	4:59	6:38	5:10	6:17	5:26	4 Aug ☾ Last Quarter 12 2 p.m.
18	6:23	5:6	6:38	5:0	6:37	5:11	6:16	5:27	11 " ☉ New Moon 10 58 "
19	6:24	5:5	6:38	5:0	6:37	5:11	6:16	5:27	18 " ☽ First Quarter 2 27 "
20	6:24	5:5	6:38	5:0	6:36	5:12	6:15	5:28	26 " ○ Full Moon 11 2 a.m.
21	6:25	5:4	6:38	5:0	6:36	5:12	6:14	5:28	
22	6:26	5:4	6:39	5:1	6:36	5:12	6:13	5:28	
23	6:26	5:3	6:39	5:1	6:35	5:13	6:12	5:29	
24	6:27	5:3	6:39	5:1	6:35	5:13	6:11	5:29	
25	6:27	5:2	6:39	5:1	6:34	5:14	6:10	5:30	
26	6:28	5:2	6:39	5:1	6:33	5:15	6:9	5:30	
27	6:28	5:1	6:40	5:2	6:33	5:15	6:8	5:30	
28	6:29	5:1	6:40	5:2	6:32	5:16	6:7	5:31	
29	6:29	5:1	6:40	5:2	6:32	5:16	6:6	5:31	
30	6:30	5:0	6:40	5:3	6:31	5:17	6:5	5:32	
31	6:30	5:0	...	...	6:31	5:17	6:4	5:32	

The approximate times for sunrise and sunset at Rockhampton, Townsville, and Cooktown may be obtained by using the table for Brisbane, and adding the following figures:—

1904.		ROCKHAMPTON.		TOWNSVILLE.		COOKTOWN.	
		Rise.	Set.	Rise.	Set.	Rise.	Set.
May	...	2 m.	18 m.	13 m.	41 m.	12 m.	50 m.
June	...	1 m.	19 m.	10 m.	44 m.	7 m.	55 m.
July	...	2 m.	18 m.	10 m.	44 m.	9 m.	53 m.
August	...	5 m.	15 m.	18 m.	36 m.	16 m.	46 m.

Royal Botanic Gardens Victoria



RBG00019206



